THE physical therapy REVIEW

Some Considerations of the Physiological Basis of Therapeutic Exercise — RALSTON

Physiological Basis of Methods to Elicit, Reinforce, and Coordinate Muscular Movements — FISCHER

Development of a New Service in a Muscular Dystrophy Clinic — HORVATH and MACHEK

Management of Back Injuries — WIEDER

Case Reports — ADAMS and MacTAGGART

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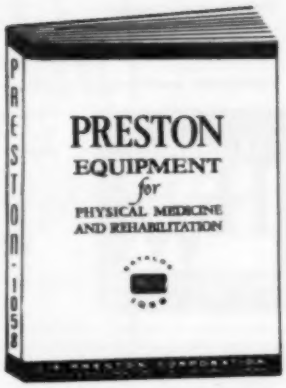

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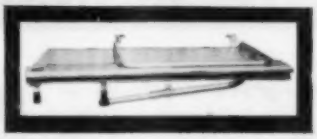

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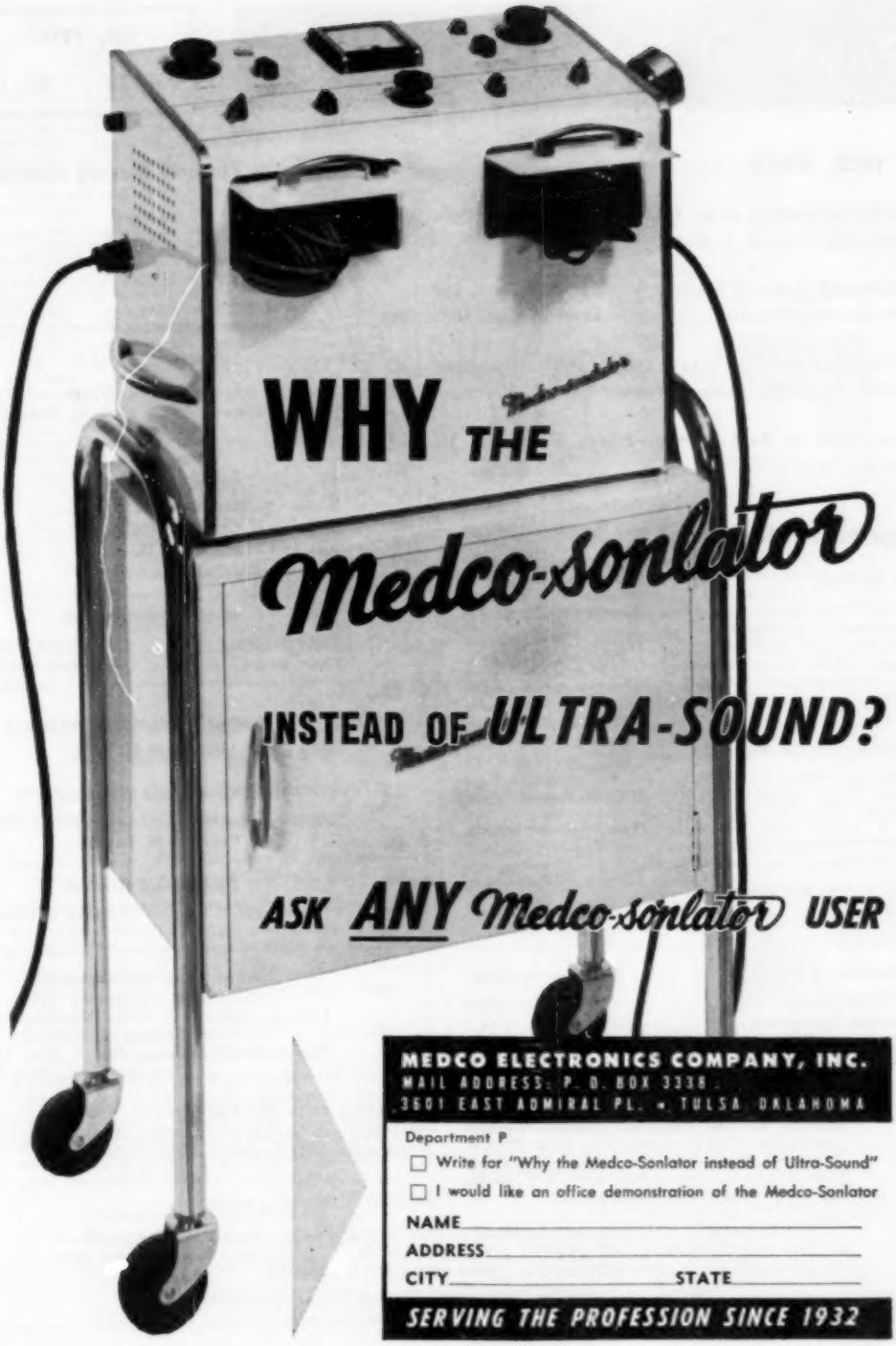

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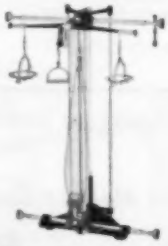

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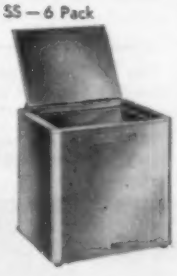

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Some Considerations of the Physiological Basis of Therapeutic Exercise*

H. J. Ralston, Ph.D.

Muscle mechanics

It is important in talking about muscle mechanics to use clear and unambiguous terminology. Much of the literature of physical therapy and physical medicine is confusing due to the rather loose use of terms which in other sciences have a clear and definite meaning. Some of the more important terms which we should use in an explicit manner follow:

1. *Work*—Work is defined as the product of force multiplied by the distance through which the force acts. It is measured in units of work such as foot-pounds, or ergs.

2. *Tension*—Tension is defined as a system of forces tending to draw asunder the parts of a body, combined with an equal and opposite system of resisting forces holding the parts of the body together. Tension is measured in units of force, such as pounds or dynes. Ordinarily in physiology when we use the term *tension*, we also may use the word *force* synonymously.

3. *Power*—Power is defined as the rate of doing work or as the rate of expenditure of energy. Power is measured in units such as foot-pounds per minute or ergs per second.

In discussing the performance of voluntary muscle in man we should strive to use the terms *work*, *tension*, and *power* in the physical sense of the terms. Since we are, in fact, employing a physical usage to begin with in the discussion or in the description of muscle performance, it behooves us to use the terms in the same sense as they are used in physics.

Muscle force

A good deal is now known about the forces generated by skeletal muscle when contracting under isometric conditions, as well as under isotonic conditions. It has been established that when skeletal muscle shortens against small loads, very small forces are generated by the muscle. For light loads these forces amount usually to only 1 or 2 per cent of the force which is produced by the muscle when contracting under maximal isometric conditions. It is fairly safe to say that any exercise which does not "push" the muscle in some degree is not going to be effective in producing much increase in the strength of the muscle (using the term *strength* to mean the ability of the muscle to generate tension or, what amounts to the same thing, to lift heavy loads).

The studies of Magnus Blix during the 1890's provided us with the first foundation for understanding the forces generated by muscle under isometric conditions. Blix studied the forces generated by muscles of a rather ideal type,

Professor of Physiology, College of Physicians and Surgeons, San Francisco.

* Reprinted upon request from the Manual (APTA-OVR Institute, April 1956), which is no longer available.

that is to say, having a parallel fiber arrangement and not having much in the way of extraneous connective tissue. Blix showed that such ideal muscle when contracting isometrically generates most force at some particular length and that the force generated at any other length is less than this. That is to say, the curve of generated tension in an isometric contraction passes through a maximum.

We do not know in the case of most muscles in the human body just what the most favorable position of a limb is for the production of maximal isometric tension of a muscle in that limb. That is to say, we do not know for a muscle in the intact body the position corresponding to the optimal length in the Blix isometric length-tension diagram. However, it seems likely, on the basis of some direct evidence and a good deal of indirect evidence, that the most favorable length for muscles of a more or less ideal type (that is to say, straight-fibered without the presence of a great deal of extraneous inert tissue) is the position corresponding to a neutral position of the joints. In the case of complex-fibered muscles, however, particularly those muscles in which the fibers are not in the direction of pull of the muscle, it seems likely that the most favorable length for optimal isometric contraction is at a length a good deal greater than that length called the resting length in the isometric length-tension diagram. In other words, muscles of a complex-fibered structure probably have to be stretched a good deal in order to produce maximal isometric tension.

On the basis of a great many studies both in man and in animals, we can estimate fairly accurately, in the case of most muscles, that their maximum isometric tension will amount to about 4 kilograms per square centimeter cross-section. The tables published by Weber, a century ago, provide us with a good deal of information about the cross-sections of human muscles, and we can estimate fairly accurately what tensions these muscles may be expected to generate in the intact body.

The excursion of muscle

The British anatomist Haines has made a careful study of the amount of shortening which may occur in muscles in the intact human body and has shown that straight-fibered muscles may shorten down to a length approximately equal to 57 per cent of their maximal extended length. For muscles of a complex-fibered type in which the fibers do not contract in the direction of pull of the muscle, Haines has shown that the same rule holds for the individual muscle fibers. In general, we may say, then, that straight-fibered muscles can shorten down to about half of their maximal extended length in the intact body.

Muscle power

The studies of the British physiologist, A. V. Hill, on frog muscle, and of the University of California Biomechanics Group on human muscle, show that the maximal power generated by muscle both in the isolated preparation and in the intact individual is developed when a load is being lifted by the muscle equal to approximately one third of the maximal tension which the muscle can generate. Thus if a muscle can generate a maximal tension of 20 kilos it will develop the most power when shortening against the load of about one third of 20 or roughly 7 kilos. Exercises in which a load of about one third of the estimated isometric maximal tension are used would be worthy of study.

Neurological control of voluntary muscle

It must be remembered that a knowledge of the fundamental properties of muscle, based upon studies of the isolated preparation, may not provide us with an altogether correct picture of the way muscles perform in the intact body. In the laboratory the muscles may be forced to work at a maximal level due to their being stimulated artificially and in a manner prescribed solely by the experimenter.

In the intact body, muscles are under the control of motor neurons lying within the central nervous system. These motor neurons can be fired at various rates and in varying numbers so that the muscle response varies, depending upon the rate at which the muscle fibers are being stimulated and upon the number of fibers which are being stimulated. Given a maximal tetanic stimulus, we know that a muscle will generate a maximal tension at a certain length as described by the Blix length-tension diagram. But the Blix length-tension diagram does not really hold or at least need not hold actually in a muscle contraction in the body, due to the fact that various neurological mechanisms exist for altering the nature of the stimulus being applied to the muscle.

We know from the studies made by Eldred, Granit, Merton, Leksell, Kuffler and others that there exists in the motor nerves of muscles a

group of fibers now commonly spoken of as the gamma fibers. These gamma fibers in the mammal innervate the muscle spindles, which in turn are importantly implicated in the control of the excitability of the ordinary motor neurons (the alpha neurons) lying within the central nervous system. Experimentally it can be shown that in the absence of normal inflow from the spindles, the motor neurons of the cord may not be sufficiently excitable to be fired off by impulses coming from higher areas of the nervous system. This is one reason why damage to the dorsal roots of spinal nerves, interfering with the afferent inflow into the central nervous system, may result in serious disturbances in muscle performance, even though the motor outflow and the muscles themselves may not be in any way injured.

We know that the muscle spindles can be fired by impulses coming to them by way of the gamma fibers, and that the muscle spindles are also fired by stretch of the muscle. In a slack muscle the muscle spindles are not fired. In a very highly stretched muscle, the muscle spindles may also cease to fire as a result of a kind of inhibition now spoken of as "autogenic inhibition." We also know that when a muscle is stretched very much the tendon end-organs may be excited and may depress the activity of motor neurons within the central nervous system, thus providing another method whereby inhibition of motor neurons may be produced. Studies made by the Biomechanics Group at the University of California show that these effects due to spindles and tendon end-organs may be important in determining the response of a voluntary muscle in the intact body.

It turns out that the Blix isometric length-tension diagram has to have another factor added to it, namely, the neurological factor which enters into muscle action in the intact body. At the short side of the diagram and at the long side of the diagram the performance of the muscle is less than that which would be expected from the laboratory experiment, due to the absence of facilitation on the short side of the diagram and to the presence of depressing reflex influences on the long side of the diagram. The fact that these neurological mechanisms play an important role in the control of muscle performance in the normal person may be used to advantage in the therapeutic exercise prescribed for certain types of patients.

Studies recently made by Dr. Libet and other members of the Biomechanics Group of the University of California show that the neurological effects described above in the control of muscle performance may be profoundly modified by anesthetizing tendons so that the inhibitory effects of tendon end-organs are eliminated. It has also been shown that these reflex mechanisms for altering muscle performance are profoundly affected by such things as old age, neurosyphilis and other factors tending to alter the health or excitability of nerve tracts within the cord as well as motor and afferent pathways.

Another complicating factor in the regulation of muscle performance is the alteration which may occur at neuromuscular junctions under various conditions. Thus it has been shown in frog muscle, and in mammalian muscles under certain pathological conditions, that the state of stretch of a muscle profoundly influences neuromuscular transmission. Stretching a muscle improves neuromuscular transmission in those cases where neuromuscular transmission has been impaired as a result of unfavorable environmental conditions. So here we have a factor which tends within a certain range of movement of muscle to facilitate transmission and to work against inhibitory effects of tendon end-organs and the inhibitory effects produced upon spindles when they are stretched to an undue degree.

In summarizing this brief account of muscle mechanics and of some of the neurological mechanisms concerned in the regulation of muscle performance in the intact body, it may be said that muscle performance depends upon profoundly complicated factors. Many of the mechanisms are not too well understood, and no doubt there are other physiological mechanisms entering into the picture of which we have not as yet any knowledge whatsoever. It is well therefore not to be too glib in describing muscle action in the intact body. We have much to learn.

Additional valuable information which supplements this paper is available from Dr. Ralston's special review, "Recent Advances in Neuromuscular Physiology," which has been published in the April 1957 issue of the *American Journal of Physical Medicine*.

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Physiological Basis of Methods to Elicit, Reinforce, and Coordinate Muscular Movements *

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In discussing the "Physiological Basis of Volitional Movements" (*Physical Therapy Review*, June, 1958), it was shown that "transactional sensomotor" mechanisms are involved at all levels of the CNS. Our task now is to analyze how far such part-mechanisms, when preserved in a patient with volitional paralysis, can be utilized for retraining of a new motor pattern under volitional control. It was stated that as physicians and physical therapists we are interested only in that the re-acquired volitional movement be a useful one for the patient. I want to reemphasize this and add that although the new movement may not and often cannot be completely identical with the normal volitional movement, this is only of interest from a theoretical point of view. However, it is obvious that the more the reeducated movement resembles the original volitional movement, the greater, as a rule, is the usefulness of the new movement.

Our minds have been occupied with the effect of therapeutic exercise and you realize, without doubt, that there exists no type of exercise which improves range of motion, strength, and endurance by affecting only peripheral mechanisms, such as the functional state of joints and of the muscles themselves. In all exercises devised mainly for the purpose mentioned, some reeducation of the CNS mechanisms involved is unavoidable and often may even play a major role. Correspondingly, all exercises especially designed for reeducation of the CNS have also some effects on the peripheral mechanisms.

As outlined in "Physiological Basis of Volitional Movements," the integrity of the whole of the cerebral cortex is necessary for complete normal volitional motor activity in man, since the activities of various parts of the sensory cortex converge, more or less, via the motor and premotor areas to the efferent motor systems of lower levels of transaction. Therefore, generally speaking, volition itself is strongly impaired by lesions in the motor and premotor areas. Lesions at lower levels, as long as they do not sever pathways coming from the highest level, do not interfere with volition but with the pattern of movement resulting from the volition. This is especially true for lesions in the region of the basal ganglia, midbrain, and cerebellum.

There are many motor reactions left, due to still functioning part-mechanisms, after experimental elimination of the cortex, basal ganglia, and thalamus. The most important of these reactions are brought about by structures of the midbrain and have been described in detail by Magnus in his classical book [1] in 1924 and have been summarized more recently by Gellhorn.[2] But before discussing in detail these mechanisms which are responsible for the so-called "neck reflexes" and other postural reflexes, I want to emphasize that even in mammals (not

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* Reproduced upon request from the Manual (APTA-OVR Institute, April 1956), which is no longer available.

only in man) there exist some apparently simple motor reactions forming a part of total "normal motor behavior" which can only occur with integrity of at least certain parts of the cerebral cortex. For all these reactions an exact analysis by the cortex of perceptions received by various senses is needed. They are very often called "placing reactions." When a mammal is held free in the air by gripping the skin over its neck, and then slowly lowered towards a supporting surface, the animal will stretch out its limbs to support the body efficiently as soon as the feet touch the surface. Similar reactions occur in birds when landing from a flight. But not all placing reactions are dependent on visual perceptions. In the blindfolded mammal a typical placing reaction can be elicited by touching the supporting surface with the snout or with one limb. Also, these nonvisual placing reactions depend on the integrity of relatively large parts of the cortex.

All of the other part-mechanisms which we shall discuss can be seen in animals with the cortical and the thalamic-basal ganglia level of transaction impaired or destroyed. Some of these reactions often can be demonstrated in normal newborns and in young infants, since the neurons of the higher levels are not yet mature. We do not see them in normal adults but in patients in whom the upper levels of transaction are considerably impaired by injuries or pathological lesions. It is generally assumed that the reason why these reactions do not show up in normal adults is the suppression of the sensitivity of the transactional mechanism at the lower levels by the activities of the normal cerebral cortex.

The most important of these mechanisms are the neck reflexes so well described and studied by Magnus.[1] They are demonstrated to students by causing maximal decerebration rigidity in animals by a cut through the CNS at the level of the red nucleus. In such preparations, the neck reflexes manifest themselves more as tonus changes than as movements. However, in preparations with the cut not at the optimal level for extensor rigidity, the change in limb position elicited by passively turning the head has often the appearance of a limb movement. The effects which occur can be summarized as:

1. Passive rotation of the head to one side increases the extensor activity in the fore- and hindlimb (extension) on the side to which the head is turned; while on the opposite side the flexor activity is slightly increased and the extensor activity considerably decreased (flexion).

2. Inclination of the head to one side, increases extensor activity on that side and diminishes it considerably on the other side.

3. Backward extension of the head causes extension in the forelimbs and flexion in the hindlimbs.

4. Forward flexion of the head has the opposite effect from backward extension.

In eliciting these reactions, one must keep in mind that similar movements can be elicited by stimulation of the labyrinths (labyrinthine reflexes). In animal experiments any interference by labyrinthine reflexes can be excluded by destruction of both vestibular apparatus. However, since many of the labyrinthine reflexes are caused by stimulation of the semicircular canals, elicitation of these reflexes can also be avoided by turning the head so slowly that the threshold of angular acceleration needed for stimulation of the semicircular canals is not reached.

Simons[2] was probably one of the first clinicians who observed that such neck reflexes can often be elicited in patients with lesions of the rostral part of the CNS. One of his patients was especially remarkable, since the neck reflexes could be elicited only by the use of a trick. Only when the patient pressed a wooden block most vigorously with the hand of his normal arm (ipsilateral to the pathological lesion in his brain), did passive movements of the head elicit the slow movements of the arm and leg of the "volitional paralyzed" side. The phenomenon that very strong volitional efforts in one limb increases the reflex sensitivity in other limbs is well known. Every neurologist daily uses such measures of "reinforcement" to elicit more clearly a reflex otherwise not clearly demonstrable. For reinforcement of the knee jerk, the patient is asked to hook the flexed fingers of either hand around the tips of the other and to pull constantly or in jerks. Although such reinforcement methods are widely used, there is much discussion concerning the mechanism of reinforcement, a mechanism, as you all know, of highest importance in reeducation. Two of the most generally used explanations are probably both correct, since the two mechanisms assumed might be involved simultaneously. The one explanation is that volitional activity draws cortical attention to the activated limbs thus diminishing the cortical inhibitory influence upon the reflex mechanisms for the other limbs. The second explanation assumes "overflow" of excitation from a strongly activated part of the

spinal cord to other parts, thus raising the excitatory levels of the synapses found there by a true process of facilitation.

Neck reflexes can be elicited not only from patients with lesions in the rostral part of the CNS, but are regularly present in newborn and very young infants.[3] Since the progress of neuron maturation varies very much from one baby to another, it is nearly impossible to give a meaningful upper limit for the age at which these reflexes should no longer be elicitable.

Magnus[1] described in detail how the neck reflexes form an important link in the normal motor behavior of animals, especially in their "righting reactions" or "righting reflexes." If an animal is turned on his back or his side, because of labyrinthine reflexes the head is first turned to its normal position in space. This head movement stimulates the proprioceptors of the stretched muscles and of the joints involved and thus elicits the appropriate neck reflex. By its influence upon the leg muscles as described earlier in a general way, a normal standing or sitting position is reestablished. In decorticated cats such motor behavior, which is obviously a chain of reflexes, can be regularly demonstrated. Astonishingly, a very similar motor reaction can be elicited occasionally from normal cats. In a standing decorticated cat, a passive dorsal extension of the head will cause a sitting down movement. First a forward and downward movement of the pelvis, a forward movement of the shoulders, flexion of the hindlegs, and an increase in extensor tone in the forelegs will start in quick succession nearly simultaneously. In a sitting cat passive downward flexion of the head causes the cat to stand by a similar chain of reflexes.

In human beings the cortex has become so dominant over the lower levels of transaction that the subcortical righting reactions are probably completely suppressed, and the ability to right oneself requires considerable integrity of the cerebral cortex, although occasionally in pathological conditions there are some indications that there exist also in man such subcortical postural reflexes.[4, 5]

In decorticated animals, as well as in newborn babies, it can be shown that passive movements of the pelvis elicit movements of the forelegs or the arms and also some changes in neck and head position.[6] These reflexes are probably part-mechanisms involved in the primitive early crawling pattern, which is rather ineffective in babies as a type of locomotion because of weakness of the limb muscles at that time. This first crawling pattern disappears in babies during the fourth to the fifth month to be replaced later by a less primitive pattern of crawling under cortical control. A return to the more primitive pattern of crawling can often be seen in patients with impaired functions of the more rostral levels of the CNS.

Before discussing how reflexes and primitive patterns shown by patients can be utilized in reeducation, let me first discuss another phenomenon, the so-called "associated movements," which should also be utilized in reeducation. By "associated movements" is meant that with volitional efforts directed specifically to activate one muscle group, other muscle groups also become activated, and that the person in question is not able to prevent, volitionally, the unwanted activation. Any attempts to avoid this lead to a diminished activation in the primary muscle group. There is no doubt that this phenomenon, which may be very distinct in patients especially in those with hemiplegia,[10] can have various underlying causes. We often deal with a reflex-like activation of other muscles playing an important part in primitive motor patterns. Since in the normal person beyond the infant stage, these reflex patterns are inhibited by cortical function, one might call these types of associated movements pathological associated movements. However, there exists another type of associated movements which is found in normal persons also. The CNS is so organized that we are able to suppress the intrinsic mechanism of reciprocal innervation, thus, in most instances, activating simultaneously, as needed for certain supporting reactions, two muscles which are natural antagonists due to their anatomical arrangement. We would expect, therefore, that it would be possible also to activate separately all partners of a muscle group which are not complete synergists according to their anatomical arrangement. However, it is well known by anatomists and physiologists that in many people certain joint movements (especially of the hand and fingers), which can be produced passively, cannot be produced actively, although we have, from a purely anatomical point of view, a muscle or muscles which could produce the joint motion in question. But most people are unable to produce the necessary functional innervation. In any attempt to activate solely the muscle or muscles needed for the intended motion, we also activate other muscles, and different joint movement will result. These associated movements, we might call natural

associated movements, and they too should be utilized in reeducation.

These natural associated movements have been investigated carefully by Trendelenburg [11] on a relatively large number of students. He could classify his subjects in three groups, and this seems to me very important from the viewpoint of reeducation. One group, numerically the smallest, was formed by the subjects in which no or only few and limited associated movements were found. The second group was much larger. Each subject of this group showed originally a considerable number of various associated movements, but was able by exercise and training of awareness for the task required, to slowly lose, more or less completely, all associated movements. The third group, nearly as large as the second, were those subjects who showed originally about as many or even more associated movements as those of the second group, but were unable, in spite of all their own efforts and those of the experimenters, to learn to suppress the majority of their original associated movements. If we had a simple test to find out quickly to which of these three groups a new patient belongs much wasted effort in reeducation could be avoided.

Let us summarize the various applications of the physiological principles which can and should be used for elicitation, reinforcement, and coordination of muscular movements in patients with various pathological conditions. Whatever the specific pathological lesion and its anatomical location, we must keep in mind that proprioceptive awareness is most important for learning and relearning of muscle coordination. The excitability of the anterior horn cells themselves is, as we have seen, very much influenced by arriving proprioceptor impulses. Therefore, elicitation of trace activity must be tried in various joint positions. The general rule that the more stretched a muscle is, the easier is the volitional activation of its anterior horn cells, shows many exceptions even in normal subjects. The relation between length of a muscle and its volitional excitability is often very much altered either by peripheral pathology or by pathological lesions in the CNS. One should keep in mind also that in normal persons as well as in patients, proprioceptor impulses coming from other muscles of the same limbs or even from muscles of another limb can alter the volitional excitability of the muscle under investigation. When all trials of all possible joint positions have failed to facilitate volitional trace activity, reflex activation should be attempted. If a volitionally paralyzed muscle can be activated as a part response in a reflex pattern or as an associated movement, the patient is helped in increasing his muscle awareness. Often, after repeated activation of the muscle by reflex or associated activity, the patient is able to produce volitional traces. These traces can then be reinforced and finally enlarged by an exercise program well adjusted to the fatigability of the central mechanisms.

Poor posture, if caused by functional imbalance of muscle innervation, can be readily corrected by appropriate exercise. Often, not enough attention has been paid to the position of the head and neck when the person is standing at ease. With the head very slightly bent forward, but the cervical vertebral column more or less straight, a person can assume a much more graceful "poise" than with any other position of head and neck.[12] Some persons, who habitually carry their heads inclined slightly to one side, often show poor posture as result of unequal distribution of tonus to both sides of the body. This influence of the head position upon tonus distribution is, without doubt, a manifestation of the neck reflex mechanism. Why, in some persons, head position influences tonus distribution more than in others cannot be explained. We know, however, that there exists a relation between anxiety and muscle tension or tonus. Not only does anxiety increase muscle tonus, but decreased muscle tonus brought about by correction of posture often diminishes anxiety and also can decrease symptoms in diseases which have a distinctly phychosomatic component.[13] It is also reported that the performance of singers and public speakers, who were troubled with breathing difficulties, often improved after their posture had been corrected.

Without attempting to give any of the many classifications offered for patients with *cerebral palsy*, I wish only to remind you that due to the differences in the sites, in the extent, and also in the cause of the lesions, the symptoms observed vary from patient to patient. The role of anoxia and other birth injuries apparently has been overestimated.[14] You are probably all familiar with the work of Fay who introduced neurophysiological principles in the treatment of cerebral palsy by utilizing the more primitive "motor patterns" of the lower levels for reeducation of new patterns of motion. For example, in patients with only the most primitive pattern present—the "reptile crawling" (turning the head side to side, alternating extension and

flexion of cross-diagonal limbs)—one can finally accomplish a free "sailor's gait" by continuous slow reeducation and practice. It is important when attempting this that the upper extremities are not fixed by holding to a bar or crutches since the primitive pattern will show up only provided the upper extremities can freely participate in the pattern. Any resistance met by the muscles of the upper extremities will elicit proprioceptor stimulation which will inhibit the pattern. Later in the training, support can be given by a ring fixed to a firm vest and the ring connected to an overhead bar.[15]

One of the main problems with cerebral palsy patients is the extremely high spasticity. This spasticity in a limb must be diminished, at least temporarily, before any volitional efforts to activate muscles of that limb can be successful. Such lessening of spasticity can be achieved in some patients by correct selection of reflexes and positions. I will give only two examples.[16] Often in a spastic leg after the Marie-Fox withdrawal reflex has been elicited 30 to 50 times, the adductors relax and also the spasticity of other muscles diminishes considerably. A spastic hand can be "unlocked" in some patients by having the patient lie on the abdomen with the hand resting over the buttocks and the head turned to the opposite side.

The highly sensitive neck reflexes in some cerebral palsy patients are regarded by some therapists as detrimental to reeducation and, therefore, they use specially devised postures and movements to inhibit the neck reflexes to a certain extent.[17]

Hemiplegia. Signe Brunnstrom [18] has shown what can be achieved in the reeducation of hemiplegic patients by utilizing physiological principles. I was impressed to see that Miss Brunnstrom used on her two patients exactly the same proprioceptor and exteroceptor stimulations that we physiologists use with our decerebrated animals to get relaxation of the extensor tonus, to produce extensor thrust, and so on. The reflex elicitation of finger spreading was new to me. I never observed such a reflex in decerebrated dogs, but anyway dogs show very little toe spreading. Toe spreading in rabbits is well known to me as a part reaction of the "placing" reaction. This method of eliciting toe spreading has been much used experimentally for testing regeneration of the peroneal nerve, and was probably first used by Langley.[19]

Somewhat similar principles for the treatment of patients with cerebral palsy have been advocated by Kabat [20] and by Twitchell.[21] Small differences in the technics employed seem to me to be of minor importance. The devotion of the therapist, his acquaintance with the physiological principles, and his resourcefulness in finding the most favorable conditions for a particular patient, is the deciding factor in how much progress this patient will make.

One important principle valuable in the reeducation of useful motion is the utilization of the "grasp reflex" or of "forced grasping." The grasp reflex is present in very young infants,[7] and after release from cortical control in animals [22] and in man.[23] The first phase of this reflex is elicited mostly by skin stimulation of the palmar side of the hand and of the fingers, but the later phase is enforced by proprioceptor stimulation as soon as the movement has started. The more the patient's attention is distracted from the arm, the easier the reflex can be elicited. The presence or absence of the grasp reaction in patients shows as a rule little relation to the degree of rigidity present and when present, is regarded by some physicians as a good prognostic sign for spontaneous recovery.[21]

A special problem, which up to now has received relatively little attention, is the reeducation of paraplegic *patients with apparently noncomplete cord severance.* Symptoms and extent of volitional control over the lower half of the body depend on what pathways and how many have been preserved in the bridge connecting the upper and lower half of the spinal cord. There is a possibility of enlarging volitional control over the lower part of the body by reinforcement with strong volitional activity in the upper part of the body during reeducation.[24] It is claimed that with such methods, in a patient who showed originally only slight flicker in abdominal muscles and quadratus lumborum, useful volitional movements of the legs could be reeducated, and that there was even some return of sensation in the lower half of the body.[25] How far simultaneous movements in the upper half of the body can be used in such patients to diminish spasticity in the lower part of the body has not been investigated systematically.

For *patients with cerebellar lesions* there exist some old training methods, all of which are based on increasing and strengthening proprioceptor and skin perception, which leads to a diminution of the symptoms of cerebellar ataxia. The inability of many such patients to execute alternating opposite movements as quickly and regularly as normal persons is chiefly due to the inability to relax activated muscles. This is best seen in the so-called "rebound" phenomenon.

Patients with such dysdiadochokinetic symptoms can be helped considerably by resistance rhythmic stabilization exercises as devised by Kabat,[26] and by training for balance and gait with emphasis on toe flexion and keeping the knee joint unlocked.[27]

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*Development of a New Service in a Muscular Dystrophy Clinic**

Julius Horvath, B.S. and Otakar Machek, M.D.

Soon after the Muscular Dystrophy Clinic was started at Firmin Desloge Hospital, it was apparent that it was becoming more and more difficult to treat these children in the Physical Therapy Department as outpatients, since the simultaneous onset of weakness with gain in size and weight made it impractical for the mothers to bring the children to the hospital. The majority of children had pseudohypertrophic and juvenile types. A few had facioscapulohumeral muscular dystropy. The patients were either treated by medications only, none of which helped, or they were not treated at all but seen periodically in the Muscular Dystrophy Clinic by the medical evaluation board. These facts revealed a need for a home care program.

To fill this need physical therapists began to visit patients' homes. In several instances it was necessary for the social worker to go to the home. Thus, the home care program, financed by the local chapter of the Muscular Dystrophy Association, started at the St. Louis University Muscular Dystrophy Clinic. The physical therapy portion of the program was soon utilized by

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Washington University of this city for its Muscular Dystrophy Clinic.

The objectives of the home care program are:

1. To prevent or diminish deformity,
2. To prevent disuse atrophy,
3. To supervise home exercise program and to assist members of the family in the physical management of the patient,
4. Maintain morale,
5. Instruct in the use of appliances and splints, braces, etc.

Since the home treatment program was initiated 25 months ago, 1,410 home visits have been made. It was discovered that the main achievement was not physical but rather psychological through the maintenance of fighting spirit in the parents and the children. In some instances, the philosophical approach to life and death was helpful in overcoming parental attitudes. It was pointed out to parents that although we all know, from an early age, that death is inevitable, we do not live in constant fear and this knowledge does not hinder our ambitions. Even though the psychological aspects of the disability were usually handled by the social worker and other members of the team, the physical therapist played the key role because of the close relationship with the patients.

The chemical processes of energy liberation in muscle and the change into mechanical energy are not yet fully understood, consequently myopathies are of unknown etiology and there is no specific treatment. The medical and allied professions are frequently too busy to give enough attention to the patients who present frustrating problems. This sometimes alienates parents or patients. As a result, many of the patients turn to "healers" and become victims of unscrupulous quacks. If the clinic can prevent this, its existence would be more than justified.

Within a 22 month period the number of patients in the clinic increased from 2 to 44. Reviewing the data collected in this period, we discovered the need for the following:

1. Public, lay and professional education,
2. Provision for transportation,
3. A light, removable, adjustable magnesium brace,
4. To keep children in regular classes as long as possible.

CONCLUSION

We agree that the course of the disease is not completely altered by the rehabilitation procedure, whether at home or at the hospital. We believe, however, that at this time the best available method of treating these children is a regime of exercises with proper coaching at home, not going beyond fatigue. Exercising regularly prevents disuse atrophy that can coexist with dystrophy, and is of great psychotherapeutic value. The details of exercise have not been mentioned; however, patients must be given definite routines which are changed as the disability progresses.

The Key to Research and Patient Care

A 69 frame, 35 mm color filmstrip emphasizing the personnel problems involved in meeting the health demands of the nation is now available on free loan or for purchase at $12 per set. This film strip is produced by the Department of Professional Education of the National Foundation for Infantile Paralysis and includes a 33⅓ RPM record with manual or automatic pix synchronization.

It dramatically indicates ways in which the voluntary health agencies, particularly the National Foundation for Infantile Paralysis, and governmental health agencies are cooperating to help solve a major health problem. The need for understanding, cooperation, and action between professional and community groups is stressed.

It is heartily recommended for showing to professional groups, hospital and university boards of trustees, college and university student counselors, vocational counselors, and community groups. For further information write to:

Department of Professional Education
National Foundation for Infantile Paralysis
301 East 42nd Street
New York 17, New York.

*Management of Back Injuries**

Henry S. Wieder, Jr., M.D.

A rational approach to the treatment of any condition is dependent first of all on an accurate diagnosis. In addition, when it comes to treatment of back injuries, it is important to determine, if possible, the mechanism of the injury, as treatment must be varied according to the mechanical factors involved. Therefore, for the purpose of this discussion, let us classify back injuries into three main groups, according to table I. Although it may not be all-inclusive, it will cover most of the more commonly seen injuries of the back.

As a general rule, flexion injuries of the spine are treated in hyperextension. There are, however, some notable exceptions to this principle, which we will consider as they arise.

Posterior muscular or ligamentous strains (or sprains) are as a rule of relatively minor consequence, and respond quite promptly to adequate therapy. During the acute phase, most relief is usually afforded by the use of analgesics, heat, and immobilization in the form of strapping to limit flexion (Fig. 1). If adhesive strapping is used, care must be exercised in the application of heat, in order to avoid skin irritation. Where a trigger zone can be demonstrated, local infiltration of an anesthetic agent may give dramatic relief. Recently, ultrasonic therapy has become quite popular in the treatment of these conditions, and not without merit. The use of muscle relaxant drugs has been much in vogue; in some instances they appear to afford some benefit, but as a general rule they seem to be of doubtful value.

A few words are in order concerning the not infrequent instances in which the above measures are used without relief. In my opinion, this stems almost invariably from an error in diagnosis—usually that of mistaking a strain or sprain of the lumbrosacral ligaments, ordinarily an extension injury, for a simple posterior ligamentous strain or sprain. It is obvious that treat-

TABLE I

CLASSIFICATION OF BACK INJURIES

I. *Flexion Injuries of the Spine*
- Posterior muscle strains
- Posterior ligamentous sprains or strains
- Fractures of spinous or transverse processes
- Compression fracture of vertebral body
  - Uncomplicated
  - Comminuted, with encroachment on neural canal
- Fracture-dislocation of the spine
  - Without CNS damage
  - With cord or root damage

II. *Extension Injuries of the Spine*
- Sprain or strain of lumbosacral joint
  - Postural
  - Traumatic
- Herniated Nucleus Pulposus
  - Degenerative and postural
  - Traumatic
- Fractures of posterior elements of vertebra
  - Without CNS damage
  - With CNS damage

III. *Sacroiliac Injuries*
- Sprains or strains
- Fractures of the pelvis involving sacroiliac joint

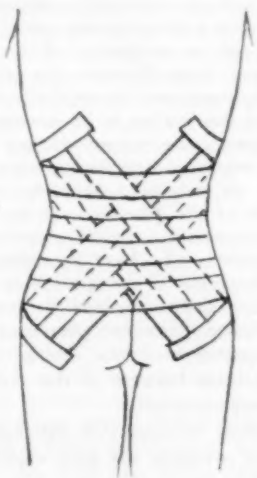

Figure 1.

Assistant Professor of Orthopaedic Surgery, Graduate School of Medicine, University of Pennsylvania; and Associate Orthopaedist and Orthopaedic Director, Outpatient Department, Graduate Hospital, Philadelphia.

* Presented at the Annual Conference of the American Physical Therapy Association, Detroit, June, 1957.

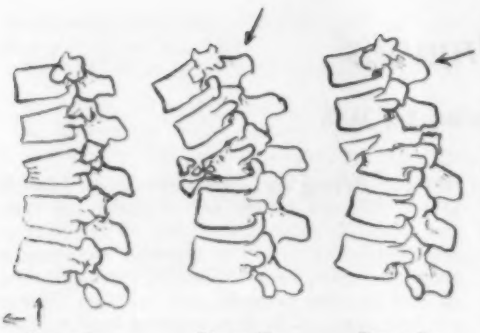

Figure 2a. *Figure 2b.* *Figure 2c.*

(Drawn from Watson-Jones "Fractures and Joint Injuries," with permission from the publisher. E. & S. Livingstone, Limited, Edinburgh, p. 949.)

ment in extension would not likely result in relief of an extension injury.

Fractures of the spinous or transverse processes of the vertebrae are usually the result of indirect violence, with muscle or ligamentous pull being directly responsible for the fractures. These also, while painful, are not of serious consequence in themselves. Transverse process fractures are occasionally accompanied by considerable retroperitoneal hemorrhage, which may lead to paralytic ileus of the bowel. This complication, unless adequately cared for, may have some serious import. For relief of pain of the fractures, local anesthetic injections are often most helpful, in addition to the use of analgesics and a supportive strapping. Under ordinary circumstances, these fractures are not expected to leave any permanent residual disability, even in the event the healing is by fibrous union instead of firm, bony union. In the occasional instance in which an ununited spinous process is responsible for persistent symptoms, the offending portion of the process may be excised, a relatively innocuous surgical procedure. As a rule, the patients who have persistent disability following fractures of the spinous or transverse processes are those involved in insurance or litigation claims. However, persistent symptoms may be expected to follow multiple transverse process fractures because of the extensive soft tissue damage sustained.

Compression fractures of the body of the vertebra are probably the most commonly seen of vertebral fractures (Fig. 2a). The reason for this is that in addition to severe trauma, which is usually the cause of most other vertebral fractures, pathologic conditions of the bone involving the vertebral body, combined with minimal trauma, or even with only the normal gravitational stresses and strains, may result in varying degrees of compression of the body of an involved vertebra. Thus, we quite commonly see this type of fracture in the older age group, where senile or postmenopausal osteoporosis, or metastatic or primary malignancy of the spine set the stage for the fracture. Another group in which compression fractures of the vertebral body are commonly seen is in those persons sustaining injury as a result of a fall from a height, especially when they land on either feet or buttocks. Thus, we feel it indicated to obtain X rays of the spine in patients who have sustained injuries in this manner, since frequently the symptoms of the peripheral injury may mask initially the fracture of the vertebral body. Another fertile field for the production of vertebral fractures of all varieties is the highway accident. In this group, unfortunately, the trauma is often severe enough to produce more than mere compression of the body of the vertebra (Fig. 2b, 2c).

The treatment of compression fractures of the vertebral bodies varies with the degree of compression, the age of the patient, the cause of the fracture, and the presence or absence of complications. Wedge compressions in the upper and midthoracic regions are not usually of much magnitude, and are most difficult to correct, because of the relative immobilization of the thoracic spine by the rib cage. In persons past 45 years of age, the degree of hyperextension necessary to reduce a wedged compression in the lumbar region is usually very poorly tolerated, because of the loss of elasticity of the ligamentous structures, and also because of a likelihood of the development of paralytic ileus. In younger patients, when the degree of compression exceeds 25 per cent of the normal height of the vertebral body, it is desirable to attempt to restore normal height by reduction of the fracture in hyperextension. This must not be attempted, however, if there is comminution of the body with involvement of the posterior cortex, so that there is bulging into the neural canal (Fig. 3). Under such conditions, hyperextension may result in further posterior protrusion, with damage to the cord or roots. In the event that posterior bulging of a comminuted compression fracture results in cord or root pressure, laminectomy for decompression is indicated, since it is not feasible to reduce the bulge by manipulative measures.

Immobilization of the uncomplicated compression fracture requires plaster fixation in maximum hyperextension, with plaster extending from the symphysis pubis to the sternal notch. Immobilization must be maintained for a period of from three to six months, depending on the fracture, during which time it is essential to build up and maintain the spinal musculature by an appropriate exercise regimen, which will be discussed later. Following this prolonged immobilization, further exercises in flexion are required, after healing is complete, to restore full mobility to the spine.

Fracture-dislocations of the spine are usually the result of flexion combined with a traversing force (Fig. 2c). This type of injury is most likely to be complicated by cord or root damage, but such need not always be the case. Serious cord or root damage is most likely to occur when the injury is in the upper lumbar region or above, where there is less freedom of the contents of the neural canal. Dislocations without lateral displacement can occasionally be reduced by traction and manipulation, but the cases for this type of treatment must be carefully selected and the patient manipulated with exceeding caution. If dislocation is accompanied by lateral displacement, there is usually locking of the facets (Fig. 4), which imposes an effective obstacle to any manipulative reduction. These patients require open operation, and usually excision of one of the locked facets to permit reduction. Following this, fusion ordinarily is required to restore stability to the spine. In some instances of fracture-dislocation, when there is immediate irreparable cord or root damage, surgery for reduction is not undertaken, since there would be little benefit to be attained by the procedure. In many of this group, stability will be attained by spontaneous fusion; in others, subsequent arthrodesis of the spine may still be required.

Fracture-dislocations are sometimes accompanied by fractures completely through the posterior elements of the spine, which thus permit the dislocation of the vertebral bodies without dislocation of the facet joints. This type of fracture-dislocation can frequently be reduced by careful hyperextension, and then immobilized as previously described.

Extension injuries of the spine are probably more common than flexion injuries, although this is not, as far as I can see, generally recognized. Certainly, in my experience, the soft tissue extension injuries are far more prevalent than soft tissue flexion injuries. It is true that

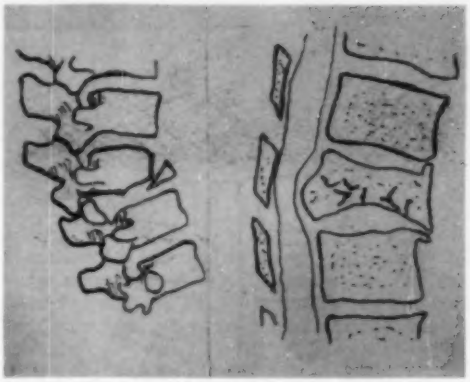

Figure 3. *Figure 4.*

Figure 3. Comminuted compression fracture of body with neural canal encroachment. *Figure 4.* Fracture dislocation with locked facets. (*Drawn from Watson-Jones "Fractures and Joint Injuries" with permission from the publisher, E. & S. Livingstone, Limited, Edinburgh. Figure 3. appears on p. 956; Figure 4. on p. 966.*)

fractures of the spine caused by extension are rather rare.

The commonest extension injury we see is the lumbosacral sprain or strain. Basically, this is the price we pay for having assumed the upright position, for in so doing, we set aside the stable arch of most four-footed animals and achieve in its place a mechanically unstable upright jointed column with multiple curves. We might compare our spinal column to a number of blocks, such as a child might build up on the floor. The blocks are relatively stable when the base of the column is straight and horizontal; however, it is obvious that should the bottom block be tilted, the pile would topple. A truly remarkable degree of stability has been attained in the human spinal column by advantageously placed joints, ligaments, and muscles which, when properly functioning, are able to withstand the stresses and strains of gravity and normal activity for long periods without pain or fatigue. However, the whole system of our normal spinal curves is basically mechanically unsound, so that any added insult, such as injury, excessive weight, fatigue, or muscle inadequacy may serve to destroy the normal compensatory mechanism, and result in symptoms.

The most commonly described onset of lumbosacral strain is either in the act of bending over, or in recovery from the flexed position, especially with lifting. For this reason, it is commonly considered a flexion injury. Actually, although occasionally a flexion type lumbosacral

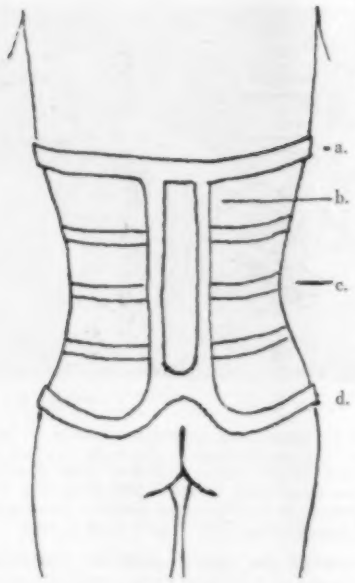

Figure 5.

a. Rib bar
b. Paravertebral uprights
c. Straps holding abdominal apron
d. Fashioned pelvic band

strain does occur, most of the times the injury is one in extension. As the trunk is inclined forward in the act of bending at the waist, flexion occurs primarily at the hips and in the upper back, while the lumbosacral joint is fixed in extension by contraction of the erector spinae muscles to counterbalance the displaced weight of the superincumbent trunk. It is only when hip flexion has reached almost its full extent that the lumbosacral portion of the spine goes into flexion, and the lumbar lordotic curve reverses. Persons with well stretched hamstring and calf muscles may even be able to touch the floor without flattening or reversing their lumbar curve. In this "flexed" position, which is actually one of lumbosacral extension, any added strain may call forth additional contracture of the erector spinae, with excessive extension at the lumbosacral joint, resulting in strain or sprain.

Treatment in the acute phase calls for rest in an attitude of lumbosacral flexion, usually combined with local heat and analgesics. The rest may be attained by recumbency in bed, with a firm mattress on boards, in semi-Fowler position. At times this is combined with pelvic traction, especially in those patients with sciatica (with or without a herniated nucleus pulposus). The rest required can also, in selected cases, be achieved on an ambulatory basis by use of a plaster flexion jacket which enforces the attitude of lumbosacral flexion. As soon as tolerated, and this is usually at once, the patient is started on a regime of exercise planned to develop the gluteal, abdominal, and quadriceps muscles, and gradually worked into further exercises to stretch tight hamstrings, adductors, tensors, and hip flexors as indicated. From the onset, the subject is instructed in correct flat back body mechanics in order to be able to get out of bed to use the commode or go to the bathroom. There is almost nothing so devastating to the acute lumbosacral strain as the act of getting onto and using a bed pan in recumbancy, and this is to be avoided at all costs. The obese patient is started immediately on a reducing diet. As symptoms subside, the exercise program is stepped up, and the patient is encouraged to become increasingly ambulatory and active. Whenever possible, we avoid the use of a brace. Some persons, however, are either unable or lack sufficient cooperation to learn to control their posture and body mechanics sufficiently to be trusted without support. In these, we use a brace with a fashioned pelvic band that comes low on the buttocks (Fig. 5) and tends to enforce pelvic flexion by virtue of being uncomfortable in the extreme when the lumbosacral joint is extended—provided the brace is properly worn. I might add at this point that this is one of the biggest difficulties and drawbacks we have with any apparatus we prescribe for a patient—getting him to wear it in the manner intended, so that it may do the job for which it was planned.

The measures described are those that we use almost routinely in most patients. Many other forms of treatment have been and are still used in selected cases with varying degrees of success. The local infiltration of anesthetic agents in tender areas has been widely practiced, but personally I rarely find it indicated or of value, since it is seldom that I am able to demonstrate a trigger zone, the stimulation of which will reproduce the pain complex. The use of muscle relaxants is occasionally of some help in persons presenting widespread muscle spasm, but more often than not I have been disappointed in the results obtained. Sinusoidal stimulation has been advocated, but in my opinion it is of little value in this condition, offering more benefit in

chronic muscular strains or the so-called "fibrositis." Ultrasonic therapy is often of value and is an excellent method of producing deep heat, as is diathermy. However, my personal opinion is that all these adjuvant measures are of distinctly secondary value, and that the most important feature of the management is the flexion regime, and teaching the patient to correct his body mechanics.

The chronic lumbosacral strain presents the same problems in management as does the acute, except that it is often more difficult to gain the patient's full cooperation after his having been through numerous and sundry prior therapeutic attempts. One of the most difficult parts in the management of chronic low back strain is guiding the patient through the ups and downs that always occur, and maintaining his interest in the program until the long term result is attained.

Herniation of the lumbar intervertebral disk, or herniated nucleus pulposus, is a popular diagnosis in acute and chronic low back pain. There is no question that the condition is relatively common, but my feeling is that the diagnosis is often made on insufficient grounds. However, the diagnostic problem fortunately does not enter into our present discussion, so we can dispense with the many arguments concerning just what does constitute adequate basis for this diagnosis.

The herniated disk syndrome is the result of pressure, traction, or displacement of nerve roots by bulging or extrusion of a portion of the disk or nucleus pulposus, due either to degeneration of the disk or rupture of the annulus fibrosus which normally encompasses the nucleus. The condition may arise as the end result of degenerative changes coupled with postural and gravitational stresses, or may be traumatic in origin. The end result is the same—root pain, with or without back pain. The treatment is commonly thought of as requiring surgery, but in actuality, approximately 80 per cent of patients with their first episode of lumbar disk syndrome can be quite satisfactorily managed by conservative means. It must be recognized, however, that failure of conservative measures to bring prompt relief to the patient with definite neurologic evidence of a disk protrusion is a strong indication for surgical intervention without delay, once the diagnosis has been confirmed by myelography (or discography, where that is the preferred diagnostic method).

The basis for the conservative management of the herniated disk is found in the fact that it has been repeatedly demonstrated, at the time of operation for removal of a disk, that the posterior protrusion responsible for the root irritation is increased when the spine is extended, and diminished when the spine is flexed. Herniated nucleus pulposus is for this reason classified with the extension injuries to the spine, and in theory should, and in practice does respond to treatment in flexion. The various measures previously outlined in the flexion regime for treatment of lumbosacral strain apply with equal validity in the conservative management of a herniated lumbar intervertebral disk.

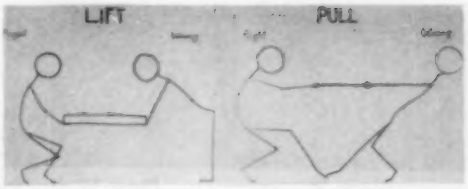

Figure 6. *Figure 7.*

Fractures of the spine produced by hyperextension are quite rare and warrant little of our time here. They are generally of two types—either avulsions of the anterior corners of the vertebral body by pull of the strong anterior longitudinal ligaments (the body breaking rather than rupture of the ligament occurring) or fracture of the pedicle or lamina by impingement in extreme hyperextension. Occasionally, fractures of the posterior element may result from trauma directly to the region of the fracture, as from a blow on the back. Treatment consists of immobilization in plaster in a neutral or slightly flexed position, until the fracture has healed—a period of three to six months—followed by mobilization exercises, as was required in the after-care of the flexion fractures.

The sacroiliac joint is probably the strongest joint in the body, by virtue of its anatomic configuration, its relatively small normal range of motion, and its strong and abundant ligamentous support. As a result, injury to this joint usually

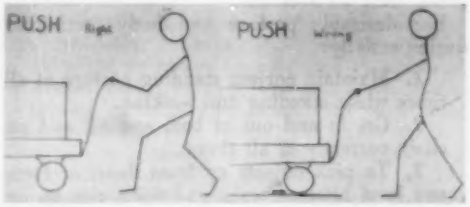

Figure 8. *Figure 9.*

Figure 10. *Figure* 11.

results only from rather severe trauma, the force ordinarily being either compressive or twisting. In most instances in this category, the joint injury is accompanied by fracture of the pelvic ring. Such injuries are seen following high speed automobile accidents, falls from a height, and rolling injuries in which the body is caught between two objects moving in opposite directions. The damage here is obvious and poses no diagnostic problem, and the treatment is directed toward restoration of the anatomic position by traction, manipulation, or other suitable means, followed by immobilization until healing can occur. There are, however, some notable exceptions to the general rule that sacroiliac injuries require severe trauma for their causation. At three times of life, the sacroiliac ligaments undergo relaxation, and render the joint vulnerable to injury from lesser degrees of trauma. These are in adolescence during the period of accelerated growth, during pregnancy, and in senescence. At these times, true sacroiliac strain or sprain may occur. Most gratifying relief is frequently obtained by the very simple measure of wearing a belt tightly around the pelvis, at a level between the anterior superior iliac spines of the pelvis and the greater trochanters of the femora. This compresses the pelvis, and supports the sacroiliac joints. In more severe or more acute cases, bed rest and immobilization in a plaster of paris double hip spica with the hips slightly flexed, may be required, along with heat and analgesics. The follow-up therapy is very similar to the flexion regime, with the same principles of body mechanics applying, but with the additional factor that anything imparting a twist to the pelvis must be avoided.

For desirable posture and body mechanics during activity:

1. Maintain correct standing posture at all times while standing and walking.
2. Get in and out of bed, and off and on chair correctly at all times.
3. To pick objects up from floor, or from any level between waist and floor, rise up on toes and gradually flex knees and hips until low enough to pick up object. Maintain correct trunk position at all times.
4. To open window, keep pelvis rolled forward and back flat. Bend knees and hips and push window up; do not pull it up.
5. When carrying heavy objects in front of body, maintain correct standing posture and carry object close to body.
6. When working over washbasin, sink, or any other object requiring bending over, approach the object by bending the knees and maintaining correct trunk position.
7. When ascending or descending stairs maintain same correct posture as that in standing and walking.
8. If it is necessary to push or pull any heavy object, maintain correct trunk position, keep buttocks tightly pinched, bend knees, and move object by extending knees and "walking" the load.
9. When getting into car or sitting at a table, sit correctly onto side of seat. Then swing legs around into position.

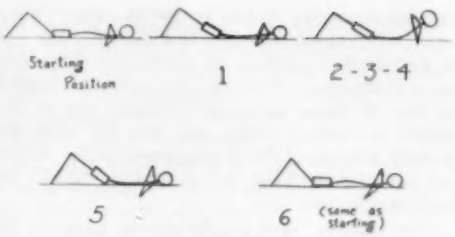

Figure 12.

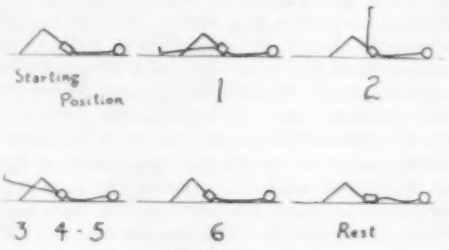

Figure 13.

As an aid to the reader in visualizing the correct body mechanics in lifting, pulling, and pushing, and to demonstrate a few examples of faulty body mechanics in daily activities figures 6-11, which are reproductions of slides used during the demonstration, are included.

Figures 12 and 13 show two exercises frequently prescribed by the author for those who for one reason or another are unable to attend the Department of Physical Therapy with the frequency and regularity required to undertake and learn the full regime previously outlined. By the use of these two simple exercises, which usually can be learned by the patient at a single visit, we provide resistive setting of gluteals, abdominals, and quadriceps, and stretchings of hamstrings, hip flexors, and erector spinae. Because there are only two exercises, which do not require much of the patient's time to perform, he is likely to pursue them despite the lack of frequent or close supervision.

Instructions for exercises, posture, and body mechanics in extension injuries and flexion injuries of the back were compiled by Eugene Michels* with the assistance of other members of the Department of Physical Therapy of the Graduate Hospital of the University of Pennsylvania, in accordance with the measures prescribed by Jesse T. Nicholson, M.D., Professor and Chairman of the Department of Orthopaedic Surgery, Graduate School of Medicine of the University of Pennsylvania, and by the author.

* For a detailed description of these exercises the reader is referred to the March 1957 issue of the *Physical Therapy Review*.

Case Reports

Physical Therapy in the Treatment of Burns

Rachel H. Adams, Capt., AMSC, and
Lois MacTaggart, 1st.Lt., AMSC

A 27 year old male Air Force Sergeant incurred burns as a result of a plane crash at West Palm Beach, Florida on Aug. 21, 1956. The United States Army Surgical Research Unit of Brooke Army Medical Center, Fort Sam Houston, Texas, was contacted and a burn team (doctor, nurse, and medical corpsman) was dispatched by airplane to take charge of the patient. Emergency care was given and the patient was transported by the Military Air Transport Service to Brooke Army Hospital arriving only 24 hours after the time of injury. Initial treatment had included intravenous fluid therapy and antibiotics, and the patient's response was satisfactory. The burned area was estimated to cover 26 per cent of his total body surface, 6 per cent of which was third degree burn. Third degree burn injury involved both forearms, the dorsal surface of the hands and digits, and scattered areas on the face and right shoulder. The face, ears, right side of the neck, posterior trunk and shoulders, and volar surfaces of both hands and fingers were sites of second degree burn.

On Aug. 23, 1956, the patient was taken to surgery for excision of areas of third degree burn on the forearms, hands and fingers. Three days later the denuded regions were covered with autografts taken from the thighs. Graft take was satisfactory other than over the proximal interphalangeal joints of the index, middle, and ring fingers of the right hand where it was apparent that the extensor tendons and joint capsules had been destroyed. Further grafting of these areas and fusion of the proximal interphalangeal joints of the right index, middle, and ring fingers at 30 degrees of flexion was done. Multiple surgical procedures were necessary to achieve wound coverage and all surgical dressings were removed Oct. 1, 1956.

On Oct. 5, 1956, the patient was referred to the Physical Medicine Service for evaluation and treatment. The split thickness grafts over the areas of third degree burns were sufficiently healed so that they would not be disturbed by physical therapy procedures; however, there remained scattered open areas which were covered with small gauze patches. Motion of the right shoulder and elbow was moderately limited, and motion of the wrists and fingers of both hands was markedly restricted. Edema was present in all injured parts, especially in the digits.

The physician prescribed active assistive and active exercises to all extremities in the Hubbard tank for 20 minutes daily followed by generalized radiant heat, a minimal erythemal dose of ultraviolet irradiation to all open areas, and lubricating massage to all healed areas.

The Hubbard tank was filled with water at a temperature of 98 to 100 degrees Fahrenheit and 4 ounces of zephiran chloride were added for antiseptic purposes. Transfer of the patient from the plinth to the water was accomplished by means of an electric hoist. Therapy was greatly facilitated by the use of the Hubbard tank. All open areas were cleansed by the water. The gauze patches covering the unhealed areas became soaked and floated off or could be gently removed by the therapist with little trauma to the ingrowing epithelium. Dried exudate was softened and the buoy-

From the Department of Military Medicine and Surgery, Headquarters, Army Medical Service School, Fort Sam Houston, Texas.

Figure 1. Residual disability, finger extension.

Figure 2. Residual disability, finger flexion.

ancy and warmth of the water contributed to the ease and freedom of movements. Mobility of involved joints was maintained and increased by active and active assistive exercise.

The patient was dried with two large luminous infrared lamps to avoid possible trauma to burned areas from the use of towels. The warmth served to relieve the sensation of chilliness experienced by the patient following his removal from the water. During the time the patient was drying, the physical therapist removed all nonviable tissue with sterile forceps.

A minimal erythemal dose of ultraviolet irradiation was given to the cleansed open areas in an attempt to stimulate epithelization and to act as a mild bactericide.

Sterile fine mesh gauze patches were cut to fit unhealed areas between grafts and applied to these surfaces to trap exudate, preventing adherence to bed linen and facilitating cleansing on the following day.

An ointment composed of two parts lanolin, two parts cold cream, and one part olive oil was used as a lubricating medium for massage to all healed areas. This was done to keep the new skin as pliable as possible and to relieve pruritus. Application to areas of second degree burns and to newly healed donor sites was cautious as even the slightest friction over tender new skin appeared to produce blisters.

Ambulation was delayed for a week to allow donor sites to heal completely. Both lower extremities were wrapped from toes to groin with cotton elastic bandages prior to ambulation to minimize dependent edema and to protect against rupture of superficial capillaries in the healing donor sites. Protective wrapping of the legs while upright was continued for several weeks and then omitted for gradually lengthened periods. When ambulation was permitted, therapy to upper extremities was altered by substituting whirlpool at a water temperature of 100 degrees Fahrenheit for the Hubbard tank. Radiant heat and ultraviolet irradiation were continued until all open areas were completely healed. Friction massage to adherent scars, intensive active and resistive exercises, swimming in the therapeutic pool, physical reconditioning, and occupational therapy were added to the patient's program at this time to further increase the range of motion and strength of the extremities.

The patient's hands presented the greatest problem because of skin contractures in the web spaces and limited range of motion in the metacarpophalangeal joints. In an attempt to increase range of motion of these parts, supervised exercises were done with each affected joint. At the end of the patient's active range of motion assistance was given and continued to pain tolerance. At this point the patient was asked to attempt to maintain the achieved position before relaxing. Daily repetition resulted in a gradual increase in range of motion and by Feb. 15, 1957, the doctors believed that the patient had received maximal benefit from supervised physical therapy. The range of motion and strength were normal in the left upper and both lower extremities. The only residual functional disability was found in the right hand and fingers. The metacarpophalangeal joints showed normal extension but lacked 25 degrees of flexion; the proximal interphalangeal joints of the index, middle, and ring fingers had been surgically fused at 30 degrees of flexion; and there was a loss of motion of 20 degrees in the web space.

Because of the rigid physical requirements of the service, the residual disability precluded the patient's remaining on active flying status with the United States Air Force, but he intended to obtain similar work in civilian life.

COMMENTS

A Surgical Research Unit, which has as one of its primary missions the care and treatment of burn patients, is located at Brooke Army Hospital and has provided an opportunity for the Physical Therapy Department at Brooke Army Hospital to play an extensive role in the rehabilitation of these patients. This case report has been presented because it is representative of physical therapy for burns at Brooke Army Hospital.

A Patient Solves Own Drop Foot Problem

Vera R. Ford, M.A.

An adult, female, postpoliomyelitis patient wanted to discard her short leg brace for cosmetic reasons. By manual muscle test the foot was flail but had normal range of motion and the ankle standing and walking was afforded good lateral stability by strong ligamentous support.

The problem presented was how to obtain adequate dorsiflexion to eliminate the steppage gait.

At the patient's suggestion a sturdy, low heel, oxford-type shoe was taken to the Shoe Shop. After numerous trials with various amounts of weights, 11 ounces of lead were inserted into the posterior aspect of the leather heel and polished to the color of the shoe leather. The amount of weight for this particular size foot and ankle

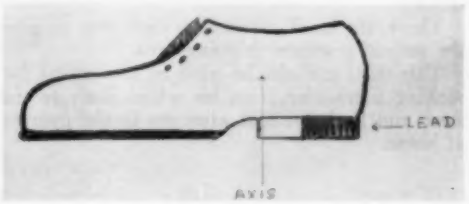

Figure 1.

acting on the axis of the flail ankle joint, pulled the heel downward, lifting the toe upward, thus eliciting a near normal heel strike.

The following gaits of this patient were observed and analyzed:

1. Gait without supportive device,
2. Gait with short leg brace, and
3. Gait with weighted heel shoe.

The consensus of the Physical Therapy Staff was in favor of the weighted heel shoe in this case because it offered cosmesis, good gait, and eliminated supportive device.

Assistant Director of Physical Therapy, Orthopaedic Hospital, Los Angeles.

A Bathtub Stool

Irving Kronenberg, B.S.

This bathtub stool was designed and constructed through the combined efforts of the physical therapy and occupational therapy departments at the New York Regional Respirator and Rehabilitation Center, Goldwater Memorial Hospital, Welfare Island, New York.

It provides a relatively easy and safe means for a patient with good triceps strength to get into and out of the bathtub. The stool is constructed to fit the contour of the tub in the rear and bottom. This utilizes minimal space and allows enough room for the patient to sit comfortably on either the bottom step or the bottom of the tub; the spacing and contour prevent movement of the stool. The rear of the top step

Figure 1. Bathtub stool with back of top step shaped to fit contour of tub.

Physical Therapist, New York Regional Respirator and Rehabilitation Center, Bellevue Medical Center, Goldwater Memorial Hospital, New York, N. Y.

and the bottoms of the legs are lined with rubber to offer further protection against slipping or sliding.

There are hand cutouts on each step to give the patient a secure gripping area.

This stool can also be used by the patient for making a transfer from his wheel chair to the floor and back for mat exercises in the gym or at home.

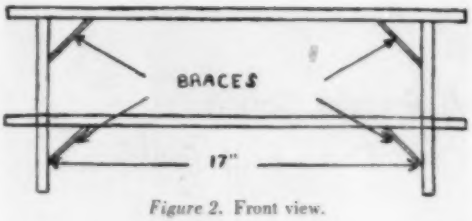

Figure 2. Front view.

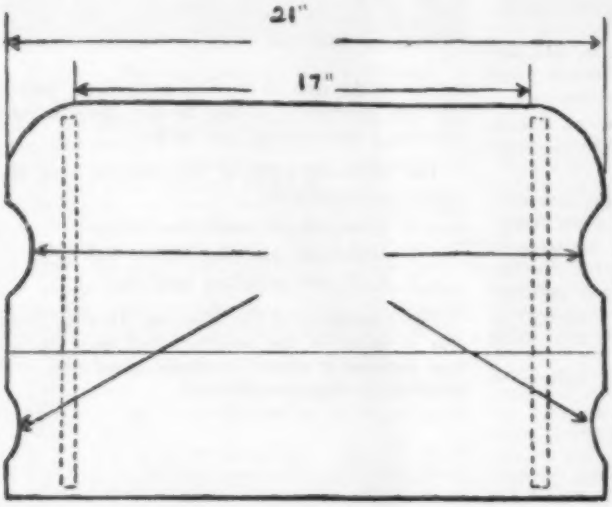

Figure 3. Top front view. Arrows point to cut outs.

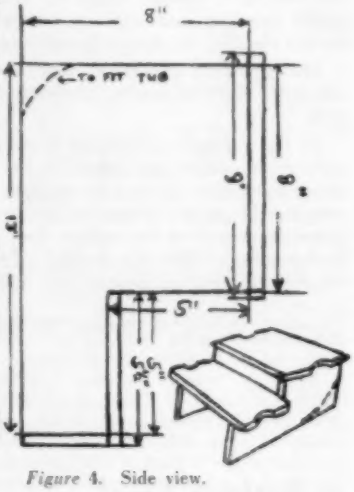

Figure 4. Side view.

These measurements should be suited to the specifications of the individual bathtub. A rubber lining on the legs and at the rear of the top step can be made from an old inner tube.

The surfaces of the steps should be smooth and well finished.

Dues Notice

Annual dues were payable on May 1st. Your prompt response will be appreciated as a service to the Association and to insure your uninterrupted receipt of the *Physical Therapy Review* along with other membership privileges. Those who are not actively practicing physical therapy may apply for inactive membership.

Index to Current Literature

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Measurement of Heating of Skin During Exposure to Infrared Radiation. E. Hendler, R. Crosbie and J. D. Hardy, J. Appl. Physiol., 12: 177-185, March 1958

Responses to Exercise as Related to Age. D. B. Dill, S. M. Horvath and F. N. Craig, J. Appl. Physiol., 12: 195-196, March 1958

POLIOMYELITIS

An Analysis of Residual Disabilities (Paralysis and Crippling) Among 100,000 Poliomyelitis Patients:

(continued on page 492)

Editorials

After College—What?

The growth of a person as a physical therapist does not cease with the completion of the course in physical therapy. Whether the therapist utilizes his talents in the care of the patient, in the training of students, or in searching for improved methods of caring for the patient, he is always under pressure to seek within himself as well as in science those things that will help the patient in his search for the achievement of a more self-satisfying, participating, and productive human existence.

Each therapist plays a multiple role in his professional life: He has a share in his profession's responsibility to society to provide the best possible response to the patient's request for help. He participates in the human obligation to maintain and improve society by serving humanity and thereby that part of himself that is a portion of society by giving his services and understanding to the patient, student, or problem that needs his help or solution. He has an obligation to both his own and the entire medical profession to strive continuously to gain new skills, information, and the understanding that is needed to assist in the prescribed medical care.

In accepting these responsibilities, the therapist must be able to understand his patient's problems—physical, medical, and psychological—that exist as a result of his disability, as well as from being the kind of a person he was before he became disabled. In order to achieve this kind of understanding, the therapist must be aware of his own feelings about his obligations to society, his profession and his patient; his own personal needs and desires; his feelings upon success or failure; his acceptance or rejection of his patient as a person. In addition he must understand how these feelings may influence his effectiveness in carrying out treatment and on his ability to relate with his patient.

Reaching these goals does not come automatically with the achievement of an additional academic degree. Further formal study will not necessarily increase the therapist's understanding of the many aspects of human existence, even though it may increase his depth of information in his special field. The acquisition of facts is not enough—unless the goal is merely to acquire the fund of information needed to win the $64,000 prize. A *therapist* should use facts as a foundation for deeper understanding in solving the problems inherent in the care of a variety of patients. Following a formal

advanced course of study does not necessarily make for a competent therapist, but if the goal is to become a mature well-rounded person, the academic atmosphere can be a catalyst in this process. Such a milieu can be most conducive to the introspection and self exploration necessary for the therapist's personal growth in understanding, regardless of his field of interest. Exposure to and thoughtful consideration of the experiences and information gained in following a course of study could lead to acquiring the type of an inquiring attitude necessary for a person to gain a clearer understanding of people. This kind of interest must be maintained throughout his life in order to continue the growth of a person as a competent therapist. However, the exposure to an academic atmosphere does not guarantee that the student will become such a person. To be able to utilize his integrated educational experiences in understanding and helping people, distinguishes the mature therapist from the button-pusher.

Only in the process of such growth can the therapist develop real awareness of the nebulous yet obstructive barrier that lies in the way of his treatment goals in many cases. The well-rounded therapist understands that the patient is human with needs that must be recognized and met, feelings of failure, worthlessness, frustration, fear and deprivation, and with desires or needs for love, success, dependency, usefulness, adequacy, and recognition of himself as a person. The therapist knows that in helping the patient in his efforts to restore his lost physical function he would offer the patient an opportunity to become an active participant in society as well as to regain the feeling of self-worth. But, incredible as it may seem, the patient may not really want to achieve these goals; cannot believe he could achieve them; or may not want to recognize the necessity to undergo treatment. Then he may actually resist any effort to help him toward these goals or even an intermediate step in treatment. In many instances the patient may consider treatment too painful, distasteful, costly, unnecessary or even downright degrading to him so that he would rather remain disabled than undergo the treatment that would free him.

The understanding therapist knows that his job is to help the patient to recognize his physical potentialities, psychological and social potentialities. He should help the patient to accept his physical limitations and to instill in him the desire to realize his maximum potentialities for recovery.

In order to achieve the therapist's goals and the patient's, goals must be identical: Neither one can achieve these goals without the cooperative support of the other. There must be mutual understanding and respect, as well as unity of purpose between the two. A close empathetic relationship is based on the therapist's clear understanding of the patient as he fluctuates in his progress toward recovery. The therapist must recognize the ups and downs in the moods of the patient. He should be ready to utilize every opportunity for progress. The therapist must find within his own understanding the means to induce the patient to set for himself the goals that will realize his own maximum potential and to motivate him to undergo whatever he must in order to reach those goals.

ALMA S. MURPHY

Association News

Consultant Positions Open

Two consultant positions are now open on the staff of the American Physical Therapy Association. One in the Membership and Chapter Department under the direction of Dorothy Voss and one in the Department of Professional Education under the direction of Sarah Rogers.

Members who have a minimum of five years experience in the practice of physical therapy and participation in chapter and Association activities are invited to apply to the Executive Director who will furnish details. Additional experience in education for physical therapy and an advanced degree are desirable in candidates for the Department of Professional Education.

Traineeships for Graduate Study

The American Physical Therapy Association has received a grant for a period ending June 30, 1959, from the Office of Vocational Rehabilitation to administer 15 traineeships of $2,400.00 each for graduate study for physical therapists. Tentative arrangements are as follows:

1. *Eligibility requirements*—the applicant must
   a. have a baccalaureate degree from an accredited college or university,
   b. be a graduate of a school of physical therapy approved by the Council on Medical Education and Hospitals of the American Medical Association,
   c. have a minimum of two years of experience in the clinical aspects of physical therapy,
   d. be a citizen of the United States or in the process of becoming a citizen.
2. *Additional requirements for application*—
   a. Acceptance by the graduate school of choice,
   b. Evidence of physical and mental health,
   c. Proposed program of study, leading to an advanced degree, related to administration or supervision, teaching, research, clinical work.

A Graduate Study Committee, now in the process of being formed, will assume the responsibilities of completing plans for the administration of these traineeships. Physical therapists who are interested in graduate study and in applying for an award are encouraged to make inquiries of graduate schools; have their credits evaluated; discuss plans with faculty members; and outline the expected program. Further information and application forms may be obtained from the American Physical Therapy Association. Applications will be considered in August for those entering September 1958 classes.

Marriages

Maxine Allen, of Schenectady, N.Y., now Mrs. Maxine A. Stebbins, Schenectady.
Margaret M. Burke, of Minneapolis, Minn., now Mrs. Margaret B. Hampl, St. Paul, Minn.
Amy Campbell, of Fayetteville, N.C., now Mrs. Amy C. Cook, Fayetteville.
Gail Chirnoff, of Buffalo, N.Y., now Mrs. Gail C. Schaffer, New York, N.Y.
Eileen Clizer, of Spokane, Wash., now Mrs. Eileen C. Kittock, Pullman, Wash.
Lois A. Conway, of Santa Monica, Calif., now Mrs. Lois C. Ecklund, Los Angeles, Calif.
Donna Cummings, of Trumbull, Conn., now Mrs. Donna C. Ball, Trumbull.
Marijane Davis, of Winchester, Mass., to David H. Shiverick, Arlington, Mass.
Rose M. DeBella, of Wethersfield, Conn., now Mrs. Rose D. Barone, Wethersfield.
Elizabeth M. Drury, of San Leandro, Calif., now Mrs. Elizabeth D. Howe, Roseburg, Ore.
Doris A. Fallquist, of San Francisco, Calif., to Stephen R. Gospe, San Francisco.
Nancy Fleming, of Lakewood, Ohio, to Donald M. Gossard, Lakewood.
Frances Ford, of West Orange, N.J., to David C. Morse, San Diego, Calif.
Glea Gunderson, of So. San Francisco, Calif., to John Lee, Daly City, Calif.
Lavina Horkman, of Greensboro, N.C., to Bryan B. Gresham, Jr., Greensboro.
Barbara A. James, of Vallejo, Calif., to Donald C. Zepp, Vallejo.
Gladys Jameson, of Schenectady, N.Y., to Sevin Hvamb, Schenectady.
Marion Kaneko, of Menlo Park, Calif., to Kazo Nakaboyashi, Lakeland, Fla.
Joan L. Krueger, of Los Angeles, Calif., now Mrs. Joan K. Betts, Los Angeles.
Kathryn J. Legler, of Santa Barbara, Calif., now Mrs. Kathryn L. Schmutz, Santa Barbara.
Virginia A. Love, of St. Louis, Mo., now Mrs. Virginia L. Bruce, Northwoods, Mo.

Stjerna M. McKibben, of Hicksville, N.Y., now Mrs. Stjerna M. Guild, Sausalito, Calif.
Ada A. Moore, of Snyder, N.Y., now Mrs. Ada M. Harman, Snyder.
Arlene Naar, of Miami, Fla., now Mrs. Arlene N. Paul, Miami.
Helen B. Petek, of Seattle, Wash., now Mrs. Helen P. Olson, Seattle.
Jewell Radford, of Grand Rapids, Mich., to Robert Jarka, Grand Rapids.
Alice Seligman, of New York, N.Y., now Mrs. Alice S. Ehrenhalt, Richmond, Va.
Ruth A. South, of San Francisco, Calif., now Mrs. Ruth S. Parsons, San Francisco.
Marilyn Wendel, of Cincinnati, Ohio, now Mrs. Marilyn W. Copp, Cincinnati.
Lois Wernon, of Mattapan, Mass., now Mrs. Lois W. Bloomfield, Mattapan.
Betty Wersebe, of Brookline, Mass., to John U. Sawyer, Brookline.
Mrs. Mary P. Wolf, of Los Angeles, Calif., to Richard D. Smith, Los Angeles.
Leisa Zink, of Lakewood, Ohio, to Robert Yurick, Columbus, Ohio.

AMSC Chief Named to Academy of Science Committee

Col. Harriet S. Lee, Chief, Army Medical Specialist Corps, has recently been appointed a member of the Committee on Prosthetics Education and Information of the Prosthetics Research Board, National Academy of Sciences—National Research Council.

Dr. Alfred R. Shands, Jr., is chairman of the committee. He is medical director of the Alfred I. Dupont Institute of the Nemours Foundation, Wilmington, Delaware, and visiting professor of orthopedic surgery at the University of Pennsylvania.

Chapter News

California

The Executive Committees of the California Chapters voted approval of a study of the needs for physical therapy in the state and ways of meeting these needs. Northern California proposed the project as a follow-up of the Governor's Conference on Rehabilitation. The Executive Committees also voted to establish a State Coordinating Council; each Chapter in California will have a member serving on this Council.

San Joaquin Valley Chapter was host to the annual statewide meeting on March 21-23 with 150 members attending.

Southern California Chapter's Directory Committee reported as follows in the April newsletter: Facts concerning the 1958 Directory, Southern California Chapter Section:

Income (approx.) $1,030.00
Expenditures (approx.) $ 820.00
Time (approx.) 280 hours (7-40 hr. weeks)
Contributions: 3 reams of paper, and numerous other sundries including aspirin for headaches.

Planning for the 1959 Directory is already under way, but we need your help...

1. Help us compile accurate listings. *Keep Us Informed . . Return Your Questionnaires . . .*
2. Let our advertisers know that you appreciate their support. Support them with your patronage.

HARRIETTE NELSON
Directory Chairman

District of Columbia

The May 1958 newsletter carried a ballot for member's use in voting for members of the Board of Directors and Nominating Committee. Members were requested to bring their ballots to the May meeting in order that Delegates to the House of Delegates sessions in Seattle might be instructed.

Louisiana

The April 1958 newsletter urges members to study parliamentary procedures for introducing a main motion or resolution. These were published along with proposed changes in the Chapter Bylaws, a quotation from the APTA Code of Ethics and other items of interest to the members.

Michigan — Western District

The District recently enjoyed a program entitled, "Interviewing Techniques," in which tape recordings of good and poor examples were heard. Members were advised to "learn to be a good listener" as a key to satisfactory associations with patients.

Minnesota

The Chapter is discussing and formulating

ideas for projects to raise funds in anticipation of their responsibility as host to the Annual Conference in 1959. Members are being solicited for their ideas on fund-raising and for their preferences as to committees on which they would like to serve.

New Jersey

The Chapter now has a representative serving on a committee formed by the State Department of Health in the interest of broadening the services to patients having arthritis or rheumatism.

New York Chapter

"Employment in Physical Therapy" is the title of a brief article in the April 1958 Chapter newsletter. The article describes the Nurse and Medical Placement Center which is a highly specialized employment office established by the New York State Employment Service. The Chapter has a representative serving on the Advisory Committee to the Placement Center.

Greater New York District

From the District's April 1958 newsletter:
Thx Nxxdxd Kxy

Xvxn though my typxwritxr is an old modxl it works quitx wxll xxcxpt for onx of thx kxys. I wishxd many timxs that it workxd pxrfxctly. It is trux that thxrx arx forty-six kxys that function wxll xnough, but just onx kxy not working makxs thx diffxrxncx.

Somxtimxs it sxxms to mx that our own organization is not unlikx my typxwritxr in that not all of thx peoplx arx working propxrly.

You may say to yoursxlf "wxll I am only onx pxrson, I won't makx or brxak an organization." But it doxs makx a diffxrxncx bxcausx a succxssful organization, to bx xffxctivx rxquirxs thx activx participation of xvxry mxmbxr.

So thx nxxt timx you think that you arx only onx pxrson and that your xfforts arx not nxxdxd, rxmxmbxr my typxwritxr and say to yoursxlf, "I am a kxy mxmbxr in our Association and I am grxatly nxxdxd!"

Ohio

The 23rd Annual Meeting was held in Akron April 25-26 with almost 150 members attending. Eighteen active members in the Akron area assumed the responsibility for planning the occasion. Program topics included Normal Gait, Pathological Gait, Physiological Aspects of Traumatic Knee, and Dynamics of the Hip Joint in Normal Motion. The Chapter Executive Committee met prior to the program sessions and the Chapter annual business meeting concluded the gathering of Ohio members.

Oklahoma

The Chapter honored their Advisory Committee at dinner recently and a member of the Committe spoke on the legal aspects of physical therapy.

Pennsylvania — Western District

Physical therapy students at D. T. Watson School of Physiatrics were introduced to the members through the newsletter. Each student's name, home address and the school, college or university attended prior to studying physical therapy are listed.

Puerto Rico

Aida Sanchez, the newly elected president of the Puerto Rico Chapter, writes:

"For me it is not only a privilege but a great responsibility to be the president of any chapter of an organization like ours. I am very interested in the Chapter's progress and very enthusiastic about future activities that may develop. However, in order for our Chapter to progress we need to work together and get together. I very strongly feel this is not only one person's job but every physical therapist's job in the Island and this is one thing we are having difficulties with: getting everybody together. Of course, we need to stimulate interest and enthusiasm of all the Chapter's members."

Members' Publications

Ruth Reed, North Carolina Cerebral Palsy Hospital, is co-author with Leslie B. Hohman, M.D., and Lenox Baker, M.D., of Sensory Disturbances in Children with Infantile Hemiplegia, Triplegia and Quadriplegia published in the February 1958 issue of the *American Journal of Physical Medicine*.

WORLD CONFEDERATION FOR PHYSICAL THERAPY *News*

United Nations Coordinated International Programme for the Rehabilitation of the Physically Handicapped

As an instrument of international social policy the Programme is a part of the long-term, comprehensive, continuous effort of the United Nations and its specialized agencies to help raise living standards throughout the world. Guiding principles of the Programme state that "rehabilitation services cannot operate in a vacuum: they must be incorporated in a country's general health, education, social welfare and employment programmes . . . . . the kind of assistance to be provided under this international programme must be adapted to the state of economic and social development in any given country."

Based upon "an entirely new approach to the problem of physical disability" the aims and principles of the Programme are extended through the following assumptions.

The handicapped person is an individual with full human rights, which he shares in common with the able-bodied; he is therefore entitled to receive from his country every possible measure of protection and assistance, and to be given the opportunity for rehabilitation.

By the very nature of his handicap, he is exposed to the danger of emotional and psychological disturbance, resulting from a deep sense of deprivation and frustration; he therefore has a special claim on society for sympathy and constructive help.

He is capable of developing his residual resources to an unexpected degree, if given the right opportunities, and can generally become an economic asset to his country instead of a burden to himself, his family and the State.

Handicapped persons have a responsibility to the community to contribute their services for the economic welfare of the nation in any way that becomes possible after rehabilitation and training.

The chief longing of the physically handicapped person is to achieve an independent life in a normal community, instead of spending his days in a segregated institution, or as an acknowledged invalid.

The rehabilitation of the physically handicapped can be successfully accomplished only if members of medical, educational, social and vocational services work together as a team.

To secure general acceptance throughout the world of this new attitude towards physical disability is a top priority task for all international agencies, whether governmental or voluntary.

Paris, Anyone?

A recent letter from Le Commissaire General J. Dupuis-Deltor and le President A. Nicolle, D' Organization du III 'Congress International' de la World Confederation for Physical Therapy stimulates our anticipation.

"In reply to your letter we would like to give some details for the program of the Third International Congress of the World Confederation for Physical Therapy. The Congress will take place in Paris from Sunday, September 6 to Saturday, September 12, 1959.

"The Opening Session will be in the Palais de Chaillot and the working sessions at the New Faculty of Medicine. The communications and demonstrations will take place Monday, September 7 in the afternoon, the whole day on Tuesday the 8th, and Wednesday the 9th; on Thursday the 10th in the morning, the whole day Friday the 11th and in the morning on Saturday the 12th. The afternoon of Thursday the 10th will be devoted to the General Assembly of the World Confederation.

"The Committee for Organization has on the agenda a reception for all those taking part in the Congress at the museum of the Louvre on Sunday evening, September 6th. Monday evening will be reserved for an excursion on the Seine, Tuesday evening for a performance at the Opera, Thursday evening for the banquet, and

Friday evening for the show "Sound and Light" at the Chateau de Versailles. Furthermore, the delegates and the foreign associations will be received Wednesday the 9th at the end of the afternoon at the Hotel de Ville (City Hall), and various excursions are planned for Saturday afternoon the 12th and for Sunday the 13th."

New Student Members

College of Medical Evangelists
Eleanor S. Cooper

Columbia University
Rosemary M. Scully

Marquette University
Faith H. Rotta

Stanford University
Leland J. Werner — Carol L. Williams

University of Connecticut
Judith E. Backman — Judith Marsh
Catherine S. Blake — Donna L. Reeves
Susan Dolan — Sebastian F. Scarfe
Alta I. Johnson — Catherine D. Sherrill
A. Eugenie Tetreault

University of Minnesota
Janell C. Koep — Mary K. Wellenstein

University of Oklahoma
Robert Butrum

University of Wisconsin
Victor C. Cascio

Washington University
Martha L. Barrett

Reprints of Bobath's Articles Available

Members may order the following reprints from the Division of Physical Therapy, Stanford University, Stanford, California:
"A Study of Abnormal Postural Reflex Activity in Patients with Lesions of the Central Nervous System." Reprinted from *Physiotherapy* September, October, November, and December 1954. (30 pages) 50 cents.
"Control of Motor Function in the Treatment of Cerebral Palsy." Reprinted from *Physiotherapy* October 1957. (8 pages) 25 cents.

Index to Current Literature

(continued from page 485)

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Student Column

This Is Your Life, Percival Pain

Jean Plaster

Welcome to our program, Mr. Percival Pain. You have been selected for this citation because you have done such an excellent job of sending more people to seek medical care than any other symptom. Furthermore, you have been highly recommended by both Mr. Blakiston and Mr. Webster for meritorious work in the realms of suffering, uneasiness, and distress; and we therefore feel that you justly deserve the honors we are bestowing upon you tonight.

Anyone in T.V. Land who has ever experienced a pricking, burning, stabbing, tearing, stinging, or throbbing sensation will have no difficulty in recognizing our special guest this evening. Mr. Pain is also responsible for those sensations described as aching, sore, pulling, and cramplike. When these feelings are elicited from the skin in short stabs, they are known as "bright." If they are heavy, diffuse sensations from the deeper layers, they are referred to as being "dull." Autonomic responses to deep visceral pain often cause people to feel sick.

Percy, I know that you have entered the lives of each and every one of our viewers in many different ways, so I would like to begin the story of your life by introducing some of the means by which you do this to our audience. Coming on stage now are the Excessive Brothers: Temperature, Tension, and Pressure. Following them we find Chemical Agents, Electric Currents, Scratching, Cutting, Disease, and Organic Disorders. These agents all have one thing in common—the threat of damage to living tissues—and it is through them that you, Mr. Pain, gain entrance into human lives. Since the endings you have within their bodies are not selective, I am sure our viewers can readily see that you can utilize each of these agents with equal efficiency.

Once you have gained entrance into a body and have developed an action potential on the sensory nerve fibers, the ensuing path is relatively simple. Here, to help you further enjoy your hour of glory, are your old friends and assistants, the fine, nonmedullated C Fibers and the thin, medullated A Fibers. They have gladly taken time from their job of conveying impulses from free nerve-endings, or receptors, to second order neurons in order to be present at this grand occasion. These fibers carry only pain sensations, and they all make their entry into the Central Nervous System via lateral divisions of the posterior spinal nerve roots or by the cranial nerves.

Guess who is waiting behind the curtain just dying to come out and congratulate you!—None other than your old, trusty friend by whom the second order neurons convey your impulses to the brain, Mr. Lateral Spinothalamic Tract!! He was flown here tonight through the courtesy of the Intra Corpus Ballistic Missile Corporation, to contribute his part to your success. Mr. L. S. Tract carries pain impulses exclusively from the skin, muscles, tendons, joints, and viscera. Most of his fibers decussate en route, but some ascend the tract homolaterally. They all make third order neuron connections in the dorsomedial ventral nucleus of the thalamus. Unfortunately, Mr. Thalamus could not come tonight because of an attack of the Asian flu but, as far as we have been able to ascertain, he is on the nerve pathway over which Percival Pain's impulses travel.

Impulses are begun in nerve nets, which are formed by interconnecting ramifications of many axons. They are then sent by the parent axon from the free nerve endings via the A and C fibers and the lateral spinothalamic tract to the thalamus. From the thalamus, neurons of the third order may lead to the somesthetic area of the cerebral cortex in the posterior central gyrus, but even Mr. Pain is not too certain as to the accuracy of this pathway. The various stimuli cause a chemical substance to be released, which in turn, is what stimulates the end-organs, thus setting up the chain reaction of impulses as already mentioned. Impulses will continue to flow as long as the chemical persists, even after the stimulus has been removed. Some areas of the body are more sensitive to pain than others. These pain spots are more profuse near the roots of the limbs, where they number 200 per square centimeter, as compared with the 40 to 70 per

Senior in the Division of Physical Therapy, School of Auxiliary Medical Services of the University of Pennsylvania, assisted by a National Foundation for Infantile Paralysis Scholarship.

square centimeter on the palms, soles, and the tip of the nose.

Mr. Pain's tripartite personality is one of his most distinguishing features. He actually has a split personality, and, most amazingly, the split is three-fold! There may be some of you in the audience who are only familiar with the superficial side of his life. Perhaps you have called it cutaneous pain, or hyperalgesia. Mr. Pain makes his presence rather obvious in this instance, for the site of his mischief is easily localized. In such cases he works by way of the nocifensor nerves, which are distinct from pain fibers, and which lead to subcutaneous nerve trunks. These nocifensor nerves are so busy warding off further injury and helping the body "splint" any injured parts that they were unable to be with us tonight. They accomplish this by causing the response to an ordinary stimulus to be abnormally severe and unpleasant.

Deep pain is another view many people take of you, Percy. This occurs when you originate impulses in the muscles, tendons, and joints; thus causing people to have a dull, aching feeling that is difficult to localize. Mechanical Forces, Trauma, Infection, Sustained Muscle Contraction, and Ischemia, your VIP agents for deep pain, are all applauding you from the gallery. You can meet them all backstage after the show. However, we will call Sustained Muscle Contraction to the stage, because he has been of the greatest use to you in recent years. It is he that is responsible for the pains and aches in most organic and anxiety states. Decreased blood flow due to the compression of blood vessels within the muscles makes it impossible to adequately carry away the chemical substance that sets up the pain impulses, and thus the deep pains are longer lasting than those of superficial origin.

Percy, the third part of your personality is rather difficult to understand because it is hard to localize and explain. This phase deals with visceral, or referred pain, and we got so involved in its theories that we were unable to locate anyone to represent this part of your life on the show. As I understand it, impulses arising in the visceral structures may give rise to pain localized to more superficial structures, often at a considerable distance from the disturbed organ. Pain from the viscera of the abdomen and thorax reaches the central nervous system via afferent autonomic fibers and somatic nerves that innervate the body wall and diaphragm. Visceral pain is usually caused by distention of an organ against resistance, spasm, strong contraction, chemical irritants, and mechanical stimulation. Several theories have been offered to explain the mechanism of this phenomenon. The Convergence-Facilitation Theory states that visceral impulses facilitate somatic pain impulses normally coming from the skin in insufficient quantities to excite the spinothalamic tract fibers. On the other hand, according to the Convergence-Projection Theory, some visceral afferents converge with cutaneous pain afferents to end up on the same neuron at some point in the sensory pathway, and that these fibers are so organized as to provide topographical reference.

In spite of the fact that you are feared and avoided by many people, Percival, we should especially like to commend you for your perseverance in your work. Folks just don't seem to realize the importance of a job such as yours. Little do they know that you protect them from serious injury; and that, when they have been injured, you aid in the repair of damaged tissue by forcing them to keep the injured part at rest. How would they know when something is amiss within their bodies except by your danger signals? These signals not only warn them when something is wrong, but they aid the physician in determining where and what that something is.

Yes, Mr. Percival Pain, although at times we all try to stifle and kill you with heat lamps and aspirin, we are nevertheless extremely grateful for the unceasing work you are doing to keep us all healthy and alive. Congratulations on a job well done!!

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Please direct all inquiries regarding tuition, entrance requirements and other specific information to the school and *not* to the American Physical Therapy Association.

Abstracts

Compensation Factor in Low Back Injuries

E. Krusen and D. Fort (Baylor University Hospital, Dallas, Texas), J. AM. M. Ass. 166: 1128-1133, March 8, 1958

It has long been the impression of physicians who treat back injuries that patients receiving compensation are often more difficult to cure than those who are not eligible for such benefits.

The histories of 509 patients treated for low back injuries were studied for differences that might be related to compensation. Only 55.8 per cent of the 272 patients receiving compensation were rated as improved at time of discharge, as compared to 88.5 per cent of the 237 patients not receiving compensation.

Only patients with an acute back injury, that is, those who could relate the onset of symptoms to a particular incident were included in this study. Treatment for these patients consisted of bed rest in the jacknife position—some with leg traction and muscle relaxants—heat, and sedative massage. As soon as the patient had passed the most acute stage, low back flexion exercises were added.

Over two thirds of the patients who did not receive compensation had appeared for treatment during the first month of symptoms, whereas only about one half of the patients receiving compensation had been seen at this point. The mean number of treatments received by the compensation group greatly exceeded that for the noncompensation group, and the women expecting compensation showed the least response to treatment while receiving the greatest number of treatments.

Apparently, as a group, the patients suffering acute back strain who receive compensation present different psychological problems from those who do not receive compensation yet whose injuries may be the same. Once a cash settlement is made, the back pain and disability often subside rapidly. However, with rare exceptions, these patients are not malingering, rather they seem to be suffering from a compensation neurosis. Prompt adequate diagnosis and early conservative treatment are recommended as essential in handling these patients, but there is need for further investigation of the medical, psychological, and legal aspects of this complaint.

Adaptive Responses to Hyperventilation

B. Balke, J. P. Ellis, Jr. and J. G. Wells (Department of Physiology and Biophysics, Randolph Air Force Base, Texas), J. APPL. PHYSIOL., 12: 269-277, March 1958

The symptoms resulting from hyperventilation as an anxiety or fear reaction may be mistaken for hypoxia. Comparative experiments have shown that even experienced medical personnel are unable to differentiate symptoms of hypocapnia and hypoxia. Great individual variations in susceptibility to hypocapnia, as well as observations from experimental research, suggested the possibility of some kind of adaptation to hyperventilation.

These experiments were designed to determine the response to mechanically induced hyperventilation in terms of psychomotor coordination, circulatory and respiratory functions and changes in the acid base balance of the blood. The normal response patterns were compared with experimental results after daily training in hyperventilation, after physical training and after acclimatization to an altitude of 14,000 feet.

Passive hyperventilation was induced at 3 times normal rate of breathing, using a portable respirator. Volume was measured with a dry gas meter. Blood and urine studies were carried out during and following the tests.

After the normal response to hyperventilation was established, the technic was practiced daily for 30 minutes and increased gradually to 60 minutes at the end of a 2 week period. Subjects engaged in various types of physical exercise for a minimum of 2 hours a day. Following completion of these tests a whole laboratory was transferred to Mount Evans, Colorado (14,160 feet), and 5 weeks were allowed for acclimatization to this altitude before the subjects were tested again.

The results showed that the control tests of hyperventilation had to be terminated after 30 minutes because most of the subjects had developed severe symptoms of hypocapnia. Psychomotor performance deteriorated to 50 per cent of normal values.

During the training in hyperventilation all subjects experienced a progressive improvement in tolerance for hypocapnia. The symptoms of hypocapnia encountered at the end of the 60 minute hyperventilation test were comparable to symptoms observed during the initial 30 minute control test. The psychomotor tests revealed only a mild deterioration to 82 per cent of normal performance during the first half hour and a further drop to 72 per cent at the end of one hour.

Physical training and high altitude acclimatization did not show the improvement in function displayed by the first groups. The adaptive mechanisms were apparently not of a biochemical nature and are still a matter of speculation.

Counter-Torque Suspension (A Conservative Means of Treatment for Lumbar Disc Herniation)

Euphane Logan, PHYSIOTHERAPY, 44: 71-74, March 1958

Physical therapists are constantly confronted with different means of treating the lumbar disk herniation. The method described requires a Guthrie-Smith suspension frame.

Another author has stated that there is more rotation in the lumbar vertebrae than the anatomy textbooks admit. This rotation progressively increases from L 4, 3, 2 up to the thoracic vertebrae. It is suggested that the lumbar disks suffer distortion and bear a great measure of the torsional strain. The principle of counter torque is to place the patient in a position of torsional strain which is opposite to the traumatic torque. This method utilizes the mechanics of the most common manipulative procedure for the reposition of the herniated lumbar disk, that is, the pelvic twist.

To enable the physical therapist to determine in which direction the traumatic torque lies, the following clinical signs should be elicited:

(1) With the patient supine the pelvis is rotated to the left, noting the position of most pain.

(2) With the patient prone, strong lateral pressure is exerted by the thumb, against the spinous processes of the lumbar vertebrae starting at L 1 and working downward. There will be increased pain on one side and none on the unaffected side. If the two signs are coordinated, that is, the right hip rotation to the left produces pain, and pressure on the left side of the spinous processes produces pain, it is then assumed that the traumatic torque is one in which the pelvis and hip are rotated to the left and the right shoulder is rotated backwards to the left.

The method of suspending the patient is illustrated by photographs. The patient should be able to tol-

erate 20 minutes of suspension. If he has acute pain, the suspension time is lowered to 5 minutes and gradually increased. The suspension may be painful at first. Treatment should be repeated daily until the patient is symptom free. If a patient has severe pain during treatment or increased pain after treatment, the signs should be checked to be sure that the correct counter torque is being given. Patients are usually stiff for an hour or so after treatment, followed by a decrease of symptoms for an hour or two. This period of relief increases as treatment proceeds.

Diagnosis, Prognosis, and Rehabilitation in Patients with Aphasia

E. Hoerner and B. Horowitz (Kessler Institute for Rehabilitation, West Orange, New Jersey), J. AM. M. ASS., 166:1573-1576, March 29, 1958

The aphasic patient presents a complex and difficult problem to all concerned; yet through careful evaluation much can be done to help him. A patient recovering from a cerebrovascular accident needs all the support and encouragement that can be provided in view of the organic and psychological trauma he has suffered. The existing aphasia should be considered as a disturbance having four aspects or involving four functions: understanding, talking, reading, and writing. Careful diagnostic tests identify the nature of the impairment and form the basis for establishing a program of therapy.

The treatment program is divided into both individual and group therapy sessions and includes both definitive and multistimuli procedures. An aphasic patient needs strong stimuli, regardless of which areas of language are affected. As morale building is the constant concern of all therapies, records should be kept of the patient's progress since he is apt to lose sight of it. The objectives of the training program are based on the small and gradual increments of improvement. A spirit of competition often results from group sessions and activities which do much to stimulate, relax, and support the patient. Anxiety and frustration become markedly reduced as the aphasic patient communicates with someone having a similar disability.

In the therapeutic program, the emphasis is on retraining and rehabilitation of the whole patient by the medical team.

Treatment of Mallet Finger By Complete Metacarpophalangeal Flexion

Thomas D. Hall and Alzir B. Alves (Department of Orthopedic Surgery, Northwestern Medical School, Chicago), SURG. GYN. OBST. 106: 233-237, February 1958

The treatment of injury to the extensor mechanism of the distal phalanx at its insertion continues to present a difficult problem for the surgeon.

The deformity referred to as mallet finger is a result of either an avulsion of the extensor slips of tendon or an avulsion chip fracture of the dorsal and proximal portion of the phalanx with the attached tendon.

A cardinal principle in the treatment of tendon injuries, by either closed or open measures, is immobilization of the complete musculotendinous mechanism in the relaxed position. The immobilization most popularly employed today is phalangeal. Such immobilization is limited to only the tendinous expanse of the interphalangeal extensor mechanism and disregards the muscular expanse. Complete relaxation of the interphalangeal extensor mechanism cannot be obtained without metacarpophalangeal flexion. Failure to include this joint parallels treatment of flexor tendon injuries of the hand without inclusion of the wrist and elbow.

This principle of relaxation of the entire musculotendinous expanse of this extensor mechanism has been overlooked in the treatment of mallet finger injuries with only phalangeal immobilization. The authors recommend the additional immobilization of the metacarpophalangeal joint in flexion. The anatomic rationale is given and discussed.

Concerning the possible development of flexion contracture of the metacarpophalangeal joint as a result of prolonged immobilization in the completely flexed position: the authors have never seen a flexion contracture of the metacarpophalangeal joint resulting from prolonged immobilization and have no knowledge of its occurrence. None occurred in 11 patients after 5 weeks immobilization.

A simple modification of the Bunnell pull-out wire suture for repair of tendon avulsions at the distal interphalangeal joint is described. In 11 patients 10 were treated surgically followed by immobilization in a simple hand cast. Neither cast nor pull-out suture was removed in the five week period. No infections occurred. The advantages of the modified hand cast applied is compared with the tubular phalangeal cast. The incidence of excellent and satisfactory results subsequent to surgical repair indicates the merit of primary repair in the absence of roentgenographic visualization of approximation of the avulsed extensor mechanism. Approximation is apparent when a bone fragment has accompanied the tendon avulsion.

Domiciliary Physiotherapy

Doris M. Baker (Elizabeth Garrett Anderson Hospital, London), PRACTITIONER, LOND., 180: 316-320, March 1958

Much can be said in favor of the mobile unit as part of the equipment of every hospital's physical medicine department. The chronically ill patient who is confined to his own home is much in need of such a service. Many should be in hospitals but there are few facilities for long term patients. Conveying them to the hospital or clinic two or three times a week is wasteful of time and manpower and often medically undesirable as the patient may become exhausted from the traveling and waiting for treatment and transportation. Often any value that may have been derived from the treatment is dissipated. There are advantages of a social nature in attending a hospital or clinic, as the patient meets others who are disabled but the disadvantages quite outweigh benefits of this kind.

Among the advantages of having the physical therapist visit the home is that the family can be instructed in how to make the best use of the facilities in the house. The patient's bed can be checked and adapted to give the best support for painful limbs. The patient can be instructed in the use of devices designed to help him in carrying out self care or household tasks, and the physical therapist can help in countering oversolicitude and in insuring that the patient is allowed to do as much for himself as possible.

Since this service can be abused, either by treating patients over too long a period of time or by giving treatment to patients who are not in need of it, a definite number of treatments should be prescribed and this number should not be exceeded unless the patient's doctor considers that it is necessary.

A mobile unit lightens pressure on physical therapy departments, am-

bulance and car services, and aids the patients by helping alleviate the suffering, misery, loneliness and self pity of the chronically ill.

General Principles of Fracture Management in the Aged

Edgar M. Bick (Orthopaedic Service, The Mount Sinai Hospital, New York), SURG. GYN. OBST., 106: 343-346, March 1958

The author reports on a study of a series of over 500 fractures and dislocations occurring among the elderly. The study was made in order to gauge the relative advantages and disadvantages of current concepts of fracture therapy when applied to the problems of the aged.

With three exceptions the distribution of fractures and dislocations in elderly patients is more or less the same as would be found in any adult group. The exceptions are the hip, the vertebra, and the shoulder. These three represent 58 per cent of the total fractures or dislocations found in this age group. Elderly females are far more subject to fracture than are their male contemporaries.

The author emphasizes that this is a report of a clinical study which does not lend itself to experimental control or precision management. However, clinical observation indicates that healing takes place in the aged within a time span equal to that of adults of all ages.

There are no technics especially applicable to the treatment of fractures of the aged. There are only limitations of objectives. The first consideration is the limited strength and limited resiliency of the musculoskeletal system in the elderly. A second limitation is the relative softness and compressibility of the bones. A third limitation appears during the period of after care. The normally decreased elasticity of the muscular and periarticular connective tissues is histologically demonstrable. It becomes necessary to temper the urge for early and rapid mobilization of the part by measures which to the tissues of an elderly person may cause excessive stretch. Enthusiastic attempts at exercise or self stretching of the affected area may result in a pain-spasm sequence which will retard rather than enhance mobility. Daily increased purposeful activity should be encouraged rather than formal exercises. Shoulder fractures are particularly slow to increase in mobility. The author states that attempts to accelerate the process by insisting on active exercise may retard motion. Daily use of the arm in everyday activities will be more successful. Daily walks in one's garden for a patient with fractures of the vertebrae are apt to be more salubrious than exercises directed to the trunk, considering the vertebral and intervertebral degeneration in the senescent spine. In recently healed fractures of the hip joint the patient should not throw away his cane. The demand that the patient should be out of bed early is of benefit only if the purpose for this is gained. To be out of bed sitting in a comfortable chair, free to move the extremities and shift position, and to reach for nearby objects is beneficial. Often, however, the patient is lifted out of bed, immobilized in blanketing, and cared for by a solicitious attendant.

The author summarizes by stating that the rules governing the general management of the care of the aged are simple enough. There should be a recognition of the organic limitations of aging structures. The simplest procedures compatible with a functional recovery adequate for his physical abilities will benefit the aged far better than a tour de force directed to an unobtainable objective.

The Juvenile Amputee

Charles H. Frantz and George T. Aitken (Area Child Amputee Center, Mary Free Bed Children's Hospital, Grand Rapids, Michigan), J. MICHIGAN M. SOC., 57: 233-241, February 1958

In the past few years, the term "juvenile amputee" has been heard with increasing frequency. Children in our communities are subject to the same trauma as adults. They are passengers in automobiles, ride bicycles on busy highways, wander into construction areas and railroad yards. Youngsters reared on the farm are exposed to severe injury from farm vehicles and complicated machinery.

Since 1946, 421 juvenile amputees have been examined, fitted with prostheses, trained in their use, and followed in an organized outpatient clinic at the Mary Free Bed Children's Hospital, Area Child Amputee Center.

The child is a malleable young human. This flexibility allows young amputees to quickly adapt themselves to prostheses in a manner seldom accomplished by adults. The young amputee grows up with his appliance, accepting it as a necessary component for his activities.

Children have greater reserve in all of their tissues. Collateral circulation is much more easily established than in adults. Degenerative changes in the vascular system are not encountered. Spur formation on the bony stump is the rule rather than the exception for adults but this is seldom true for children. Symptomatic neuromata do occur in children's stumps. Bursitis is an uncommon complication. It may occur in very active elementary school-aged boys. There were no cases of painful phantom limb in the group of children studied. Overgrowth of the long-bone stump in the child is the one constant complication not seen in adults, and must be met by surgical refashioning of the stump.

From a clinical standpoint, the juvenile amputee can be classified according to etiology: (1) noncongenital (post-traumatic and surgical) and (2) congenital (true congenital amputation or disarticulation). It is interesting to note that 68 per cent of the 196 noncongenital amputees studied lost one or more extremities from acute trauma. The remaining 32 per cent were elective amputations.

Fundamentally, the goal in attempting to rehabilitate the child amputee is to attain an acceptable degree of function in the fields of ambulation and prehension. A serious error is committed in assuming that the rapidly growing child needs only crutches until he reaches a relatively late period of his physical maturity. Such thinking overlooks the fact that growth and development are dependent in a large degree upon exercise and functional activity. The average age for children to stand upright and attempt locomotion is between 10 to 18 months. When this stage of his development is reached, a prosthesis should be fitted, no matter how simple the prescription. If the appliance is snugly harnessed for stability, the toddler amputee will ambulate. As time goes on and balance is developed, a more complex prescription approaching the conventional type of prosthesis is indicated.

The upper extremity pattern of development is more complex than that of the lower extremity. Clinical observations indicate that a child as young as 25 months will operate a voluntary opening terminal device and will be mentally aware of the capabilities of this apparatus. Infants as young as 5 months will tolerate a passive plastic prosthesis to the arm and will follow normal kines-

thetic patterns as demonstrated by creeping with the aid of the artificial limb. At present, most of the mechanical devices utilized in the fabrication of adult prostheses are available in "scaled down" sizes for children.

The team approach has been brought into the field of the child amputee. He now has opportunity to benefit from the combined skill of the physician, engineer, and training therapists.

Reconstruction of the Amputated Thumb

I. K. Mikhail (Department of Surgery, Dhahran Health Center, Dhahran, Saudi Arabia), A. M. A. ARCH. SURG., 76: 372-378, March 1958

Amputation of the thumb is not a common injury. Hence, only a few surgeons have adequate experience in the problems of reconstruction surgery of the amputated thumb. The importance of the thumb for pincer action cannot be overestimated. The magnitude of the disability led many hand surgeons to devise reconstructive procedures from the simplest to the most intricate, such as transplantation of a toe to the hand.

The anatomy of the thumb is reviewed briefly. If the thumb is amputated at the metacarpophalangeal joint or through the distal half of the metacarpal, the power of opposition is not lost because of the spared insertion of the opponens. Loss of the insertions of the long flexor and the two extensors inactivates these muscles if amputation is proximal to the base of the proximal phalanx.

Sites of possible amputation are discussed. At the middle of the proximal phalanx or anywhere distal, the resultant disability is not enough to justify reconstruction surgery. A prosthesis may be used for cosmetic purposes. If amputation occurs proximal to the middle of the proximal phalanx with part of the metacarpal left, the methods of reconstruction which may be considered are: 1) deepening the cleft between the thumb and hand; 2) lengthening the thumb by tubular skin and bone grafts; 3) pollicization of an index or a middle finger; 4) pollicization of a toe. Amputation at the carpometacarpal joint presents a serious problem. A thumb so built will be practically devoid of movement; moreover, there is no good anchorage for the bone graft.

Pollicization of a finger or toe is technically difficult. Few good results are reported. Reconstruction by tubular skin and bone grafts provide position but no opposition. Fixing of bone in position of opposition by bone graft furnishes a base for the other fingers on which to perform pincer action. Good function and rapidity of sensory reinnerveration led to choice of the reconstruction procedure of lengthening the amputated thumb by tubular skin graft and bone graft rather than by other methods of reconstruction.

This procedure, performed in 5 stages, is described in detail. Photographs and diagrams accompany the surgical description. Exercise of thenar muscles may start soon after stage 5. The average length of time for surgery is about 10 weeks. External splinting with splints or plaster is desirable for 2 to 4 months.

The growth of sensory nerves into the reconstructed thumb and the development of sensory power seems to follow the rate of 1 mm. in 2 days. The reconstructed thumb acts as a thumb with ankylosis of the interphalangeal and metacarpophalangeal joints. The function regained is worth the multiple procedures and hospitalization period.

Three cases are reported in brief detail. Follow-up checks showed return of good pincer action and sensation all over the skin graft.

Postural Vertigo: A Meniere-Like Syndrome

John R. Lindsay, MED. CLIN. N. AMERICA, 42: 547-554, March 1958

Postural vertigo is described as occurring when certain positions are assumed or positions are changed. This is differentiated from constant vertigo, which is present in all positions of the head. Postures and changes of position eliciting the vertigo vary with individual patients and may occur during the change or after the change is reached. Constant vertigo may gradually decrease and become postural vertigo, perhaps later disappearing altogether.

Some of the typical signs accompanying postural vertigo are nystagmus, ataxia and vegetative disturbances. Often posturing is necessary to produce symptoms; even sudden changes of position are imperative occasionally. Clinically significant of postural vertigo is the disturbance of the vestibular system, and nystagmus may be a localizing sign in diagnosis.

Considering the etiology of postural vertigo, insidious onset sometimes denotes space-occupying lesions such as tumors or cysts. Rapid onset of postural vertigo may point to hemorrhage or specific types of tumors. Postural vertigo is often the first symptom of central nervous system disease, accompanied gradually by other signs of CNS disorder. Vascular accidents produce sudden, severe dizziness.

Outside the brainstem, labyrinthitis can cause disturbance of the vestibular sense organs without impairing hearing. Vascular occlusion takes place usually in the peripheral vestibular system and infectious viruses may also invade this system.

With no auditory or CNS signs, definite location of lesions is difficult. However, sudden position changes may show circulatory deficiency and a vascular spasm produces a sudden attack as an isolated incident. Other lesions occur through vasomotor instability and hypotension, the menopause, upper respiratory infections, and early Meniere's disease. Drugs are not frequently a cause for postural vertigo but they must not be ruled out because some have a toxic effect on the vestibular system. Head injury and concussion usually produce postural vertigo but prognosis is good and duration of the vertigo is variable.

Vertigo is a common complaint and can be verified as to postural or constant by performing a series of "position" tests.

Specific Management for Lumbar and Sacral Radiculitis

F. B. House and S. J. O'Connor (Department of Physical Medicine and Rehabilitation, St. Joseph Mercy Hospital, Ann Arbor, Michigan), J. AM. M. ASS., 166: 1285-1290, March 15, 1958

Many cases of low back pain are caused by hypertension of the lumbosacral region of the vertebral column. Associated with this condition are signs of lumbar or sacral nerve root irritation and radiating pain down the course of the sciatic nerve. The history may reveal an injury as from lifting, and frequently shows the phenomenon of pain on coughing or from other maneuvers which raise the spinal fluid pressure. Examination usually shows a stoop and a list and palpable muscle spasm in the erector spinae muscles.

The conservative program of treatment for this condition consists of

five successive steps: 1) maintenance of proper position while lying in or getting out of bed; 2) exercises of abdominal and gluteal muscles in bed; 3) exercises while standing and walking; 4) more strenuous exercises in the lying and standing positions; and 5) attention to specific postural problems related to the patient's occupation. The patient must learn ways to carry out his normal work without extending the lower segments of his vertebral column. The crux of the whole program is the pelvic tilt or spinal flexion which must be taught the patient initially. All subsequent activity is done with the spine held in this position.

A logical and effective conservative program for a common type of low back condition, which may be called hyperextension derangement of the lumbar spine has been used in a typical general community hospital. With a program of this type fewer patients require surgery.

Rehabilitation of the Aged Amputee

Bror S. Troedsson (Department of Physical Medicine and Rehabilitation, Veterans Administration Hospital, Minneapolis, Minnesota), GERIATRICS 13: 180-189, March 1958

With the increasing incidence of arteriosclerotic obstructive disease, there is a corresponding increase in the number of amputations among aged patients. These amputees present special problems because of their general physical condition and complicating diseases. To solve these problems and get the patient back into a condition where he is able to walk again, take care of himself, and even work again, requires the combined effort of many people and agencies. At the Veterans Administration Hospital in Minneapolis, this problem has been partially solved by adapting the prosthetic appliance clinic team to the handling of these patients. The aged amputee has been found to be a man who was retired, or has been forced to quit work because his legs would not carry him any longer. He has limited resources and he is faced with the expense of an artificial limb and the problem of how to get along outside the hospital—in his own environment and in society.

The aim of the prosthetic appliance clinic team and the amputee clinic team is to make the hospital stay as short as possible, insure a suitable and useful prosthesis, restore the patient to maximum activity, guide him to suitable work or occupation, and place him in a suitable environment. The team is made up of an orthopedic surgeon, a physiatrist, a physical therapist, a corrective therapist, an occupational therapist, a social service worker, a vocational counselor and prosthetists. The patient is referred to this team immediately following amputation.

Before the amputation, oscillometric tests are made to determine whether amputation is really necessary and, if so, what is the best amputation site. The most desirable site is that with sufficient arterial circulation for healing plus weight-bearing, plus a margin for future deterioration of circulation. The patient is also instructed in pre- and post-operative exercises, and is given some idea of what kind of prosthesis he will be using, and how long it will be before he will walk again. Psychologically, this helps to prepare the patient for the loss of the limb. It also is desirable to have the patient observe other amputees.

The author presents five case histories to illustrate the methods used by the prosthetic appliance clinic team and the amputee clinic team.

The Effect of Therapeutic Mobilization on Hypercalciuria Following Acute Poliomyelitis

Fred Plum and Marcelle F. Dunning (The Division of Neurology, Department of Medicine, University of Washington, Seattle), A. M. A. ARCH. INT. M., 21: 528-536, March 1958

There are two aspects of mineral loss following acute poliomyelitis. The first 2 to 8 weeks following onset, the hypercalciuria is not proportional to the extent of paralysis. For a period of 2 to 12 months after the acute phase the degree of hypercalciuria is proportional to the extent of paralysis.

This study was made at the Northwest Respirator and Rehabilitation Center to determine if artificial mobilization will reduce or reverse the hypercalciuria in severe paralysis.

A variety of mobilization mechanisms were utilized. These included a rocking bed, tank treatment, sitting in a wheel chair at an angle of more than 45°, standing with the aid of tilt table, and crutch walking.

The severity of paralysis ranged from a quadriplegic to a paraplegic state. A urinary output study charted the calcium excretion level. There was a continuous check for renal and bladder calculus formation. The periods of study ranged from 4 to 10 months.

Therapeutic mobilization failed to reduce or shorten the level of calcium excretion. This level is believed to be related more to muscular capacity for ambulation than to walking itself.

Preventive Techniques of Rehabilitation for Hemiplegic Patients

Nila K. Covalt (Winter Park, Florida), G. P., 17: 131-143, March 1958

The introduction in this paper emphasizes the fact that when care of the hemiplegic patient is instituted early, the preventive measures can be performed by an orderly, nurse, or member of the family. This prevention of deformities and helplessness saves time and money.

The preventive rehabilitation technics are divided into three stages.

Stage I. Immediate acute (first 24 hours for all patients)
Stage II. Secondary acute
- A. After 24-48 hours (usually for all patients)
- B. After 48 hours and through the first week if no hemorrhage is occurring
- C. As soon after hemorrhage has ceased (usually 7-10 days)

Stage III. Early Convalescence

Stage I is concerned with correct bed positioning. The material is presented for all illnesses and not exclusively for the "stroke" patient. Stage IIA deals with range of motion exercises that should be carried out on the affected side. These may be performed while the patient is still hemorrhaging without harm. Basic exercises designed to prevent disuse atrophy are described under Stage IIB. The author stresses the rapidity of the onset of weakness of the unaffected side if the patient is not taught to exercise these parts also. Stage IIC introduces the patient to some self-care activities, face lying positions, and moving about in bed.

During Stage III, the patient learns more advanced activities. Standing and transferring from bed to wheel chair and walking training are introduced. It is the author's opinion that walking instructions are best given in parallel bars under the guidance of a physical therapist. However, since the purpose of this article is to

demonstrate how anyone caring for a hemiplegic patient can carry out early rehabilitation procedures without special training, an alternate method is supplied. Walking experience can be achieved using two chairs for support. It is stated that walkers are to be condemned.

The various preventive measures and exercises are accompanied by numerous illustrations.

Effect of Rapid Rewarming on Tissue Survival of Frozen Rabbits' Feet

Donald Dawson and Esther Hardenbergh (Naval Medical Research Institute, Bethesda, Maryland), J. APPL. PHYSIOL., 12: 155-163, March 1958

The treatment of frostbite has varied in clinical literature. Some authors have suggested slow thawing with relatively cool temperatures. However, in the laboratory using animals, thawing in hot water has shown increased tissue survival.

This study was set up to test the theory that ice crystal formation was the major factor in producing tissue injuries. The composition of tissue juice, which remains when the water crystallizes out, is physicochemically changed when frozen. This produces further damage to the tissues. These authors are testing the hypothesis that rapid rewarming is beneficial because it shortens the time of exposure to injurious temperatures and not because the heat is in any way beneficial. If this is true, there would be little or no difference in the extent of recovery of frozen tissue rewarmed at 35C. and that rewarmed at 43C., since the thawing time is essentially the same at both temperatures.

Rabbits in good physical condition were anesthetized. The feet were clipped and depilated. Using an immersion bath of ethylene glycol-ethyl alcohol-water mixture cooled to approximately —15C. by the addition of dry ice, the left foot was immersed and frozen. Thermocouples recorded the temperatures of the frozen extremity and the control. Immersion varied with 7 groups of animals. Some were rapidly thawed and others slowly thawed. Gross tissue changes were recorded photographically at various intervals during the recovery period.

The results showed a definite difference in survival between the rapidly and slowly rewarmed feet. Less tissue survival was observed in feet frozen and thawed at room temperature than in feet frozen the same length of time and thawed at 43C. in a warm water bath.

The Double Pin Method in the Treatment of Fractures of the Tibia and Fibula—A Nineteen Year Analysis 1937-1956

M. J. Wilson (Department of Orthopedic Surgery, New York Medical College, Metropolitan Medical Center, N. Y.), H. G. Cohn and J. H. Mower, J. OF INT. COLL. SURG., 29: 196-203, February 1958

A group of 893 adult patients with fractures of the tibial and fibular shafts was treated by the double pinning method at the Metropolitan Medical Center in New York City.

The exact procedure and instruments necessary are described in detail. Following the pinning, a cast is applied from the toes to the upper part of the thigh. When the plaster hardens, the pins are firmly imbedded in the plaster and this prevents overriding of the fragments, even though the patient becomes ambulatory.

Posterior bowing is the most common defect noted after reduction but this is easily corrected by wedging the cast once the edema has receded. The pins and first cast are removed at the end of six weeks and a new snug fitting cast is applied for an additional four weeks and at four week intervals until union is firm. The amount of union is estimated by the amount of motion present at the fracture site and not by roentgen examination.

The advantages of the double pinning method as expressed by the authors are:

a) The technic of application is relatively simple compared to open operation;

b) Excellent reduction is obtained without exposure of the fracture site;

c) The danger of delayed union or nonunion is reduced—(5 instances of nonunion in 820 "closed" cases);

d) Early ambulation is allowed, which minimizes both bone and muscular atrophy.

The only disadvantage cited is a 40 per cent loss of subtalar motion. Weight-bearing was started, on the average, in 13 days and the period of hospitalization averaged 21 days.

Our Abstracters for July

We are indebted to the following Association members for their assistance in the preparation of the abstracts appearing in this issue.

Rachel Adams	Dorothy Glidden
Joan Brewer	Marilyn Miller
Dorothy Briggs	Miriam Partridge
Sam Chelemsky	Gail Woodson
Jean Cuthbertson	Jean Thibaut

Book Reviews . . . . .

The Nurse and the Outpatient Department. *By Audrey Windemuth, B.S., Senior Clinic Nurse, Outpatient Department, University of Minnesota Hospitals; Instructor, University of Minnesota School of Nursing, Minneapolis. Cloth; price $6.50. Pp. 580. Macmillan Company, New York, 1957.*

This book will be of interest and value to all members of the health team concerned with total care of the patient. The book is focused on the outpatient phase of patient care. The first part gives the history, trends, and organization of the outpatient department; the second part deals with patient relationships, health education, health team relationships, and public relations; the third part presents suggestions for health teaching in a selected group of clinics.

The history, trends, and organization of the outpatient departn.ent movement are presented clearly and comprehensively. It is excellent background material for this aspect of care. The chapter on public relations is one of the best sections of the book. The patient is presented as the public and what he expects for service as the consumer. The importance of good public relations for every team member is summarized as follows: "It is not sufficient for her to be a skilled technician, an enthusiastic teacher of health preservation and disease therapy, a cooperative teamworker, and an understanding friend. Inherent in each of her several roles is a plus factor of which she must be aware. The plus factor is her role in public relations. Great and awe-inspiring is the challenge." (page 312) Emphasis is placed on the need for all workers to have wider social consciousness and insight, and more cognizance of social-cultural patterns in order to

meet the patient's total health needs with a truly integrated approach.

Other particularly helpful sections of the book are those on health team relationships and health education; the latter is emphasized by the Chinese adage: "When I hear it I forget it, When I see it I remember it, When I do it I know it." (page 135) The section on health teaching in various clinics gives detailed suggestions to the teacher of health. The preventive, therapeutic, and rehabilitative aspects are carefully covered.

It would have been helpful to have more material on interpersonal relations. More detailed discussion of coordination of services, continuity of care and communication, noting specific technics and methods of achieving this goal, would have been useful. A full chapter could have been devoted to this subject with profit.

An extensive list of references is at the end of each chapter.

Textbook of Orthopaedic Medicine: Diagnosis of Soft Tissue Lesions. Vol. I. *By James Cyriax, M.D. (Cantab.) M.R.C.P. (Lond.) Physician to Department of Physical Medicine, St. Thomas' Hospital, London. Ed. 3. Cloth; price $10.50. Pp. 711; illus. Paul B. Hoeber, Inc., New York, 1957.*

This work represents the third edition of Volume One of a Textbook of Orthopedic Medicine. It differs little from the edition preceding it, and the review of that edition remains entirely appropriate for the present consideration.

The chapters are unchanged in quality or quantity, numbering 25 in all. The initial 6 chapters deal with miscellaneous topics such as traumatic inflammation, referred pain, neuritis and nonspecific arthritis. Chapters 7 through 22 concern themselves with the various sections of the body, and here we note that specific mention of the sternoclavicular joint is made in chapter 8, representing the only new addition to the subject matter. The final 3 chapters return to miscellaneous topics. There has been no evident change in the illustrations, the majority of which are line drawings of acceptable quality.

The defect which this reviewer noted in the earlier edition remains strikingly apparent, this being the complete absence of a bibliography. The author has cited a few additional references in the current edition, representing work done in the past three or four years, but there is still a paucity of documentary evidence for the material presented. One wonders, in reading this text, why a new edition was necessary when the changes are so minute. The presentation still lacks any semblance of the proof or sound basis so greatly needed in texts dealing with physical (or orthopedic, as the author prefers) medicine at the present time.

One again must state, as in reviewing the previous edition, that the book cannot be recommended for general use by physical therapists. Students and relatively inexperienced therapists will find it confusing. The more experienced therapist may be able to sift some useful information from the volume, depending upon individual needs.

This reviewer has surmounted, to a degree, the temptation to refer the reader to the comments made some two years ago concerning the second edition of this textbook, thus saving time for all concerned. The temptation to offer this humble suggestion to the author is much greater.

American Academy of Orthopaedic Surgeons; Instructional Course Lectures. Vol. XIII. *Edited by R. Beverly Raney, M.D., Chapel Hill, N. C. Cloth; price $12.00. Pp. 327; illus. J. W. Edwards, Ann Arbor, Michigan, 1956.*

The American Academy of Orthopaedic Surgeons Instructional Course Lectures, Vol. XIII, 1956, is a reference book which includes many lectures presented during the 1956 meeting of the Academy. There are 27 articles prepared by the leading orthopaedists of our time. More qualified or representative authors cannot be found than Drs. Ralph K. Ghormley, Carl E. Badgley, Guy A. Caldwell, James S. Speed, Sterling Bunnell, James E. Bateman, Leo Mayer, William T. Green, to name but a few among the 34 authors.

Among the 27 articles are several which should be of especial interest to physical therapists. First of these is the panel discussion on "Surgical Treatment of Degenerative Disease of the Hip in Adults," which gives a comprehensive coverage of the surgical technic in the management of hip joint disease.

Bateman's paper on "Peripheral Nerve Injuries" presents the basic anatomy, physiology, and pathology of nerve injuries as well as pertinent diagnostic criteria, sequence of reconstruction and postoperative care of patients with such injuries.

Bunnell's article on surgery of the nerves of the upper extremity is an excellent presentation of the diagnosis and treatment of brachial plexus injuries.

Dr. Mayer's discussion entitled "The Physiological Method of Tendon Transplants Reviewed After Forty Years" reviews the original concepts of tendon transfer that the author first advocated in 1912, many of which are still applicable.

A vast and comprehensive discussion of loss of extensor power in the upper and lower extremities and methods of reconstruction is presented by Milgram. This article is especially well illustrated and documented by a good bibliography.

"The Management of Calcaneus Deformity" by Dr. William T. Green presents a concise review of the pathomechanics of the calcaneous foot together with the management.

Last, but certainly not least, is a review of the anatomy of the knee joint by Dr. Allen F. Voshall. There are numerous illustrations of the ligamentous and associated structures of the knee with discussion as to the part played by each in the mechanics of the joint.

This entire volume is of considerable value which, together with previous volumes, warrants extensive use as a reference in the teaching of orthopaedic aspects of physical therapy.

Public Health Nursing Practice. *By Ruth B. Freeman, Ed.D., Associate Professor of Public Health Administration, The Johns Hopkins University School of Hygiene and Public Health. Ed. 2. Cloth; price $5.00. Pp. 435; illus. W. B. Saunders Company, Philadelphia, 1957.*

This is a textbook, revised in 1957, written primarily for public health student nurses and those in practice. The type is a pleasantly readable size on dull finish paper. The text, while clearly outlined and frequently relieved and enriched by graphs and diagrams, is highly concentrated reading and possibly repetitious.

The content includes a wealth of succint illustrations of the what-how-when-where of public health nursing service and is replete with documented bibliographical material. The information is pertinent for the modern public health nurse and holds direct implications for other medical service disciplines including physical therapy.

The author holds that the role of the public health nurse is expanding

with the changing times from having a responsibility for the nursing care and health of the individual patient to also being concerned with the health resources of the patient's family and community in which he lives. She states clearly when the public health nurse should take leadership and when she should assume a supporting role in the interdisciplinary approach to the patient's illness and/or health. The idea of "doing with" rather than "doing for" the patient and/or family is the modern public health nurse's approach to care and this also has implications for the physical therapist. Miss Freeman gives some practical suggestions regarding effective participation in planning conferences and committee meetings, how to judge progress in patient care, how to evaluate service programs and the components of effective professional behavior. Her belief that modern public health nursing is increasingly governmentally sponsored and supported is reiterated.

Miss Freeman is a prominent leader in public health nursing service and education. She has written several books and numerous articles and has served on important national committees in behalf of public health nursing. She is well qualified to write this comprehensive textbook on public health nursing practice.

Artificial Limbs. Review of Current Developments. Vol. 4, No. 1. *Prosthetic Research Board, National Research Council. Paper; no charge. Pp. 120; illus. National Academy of Science, Washington, D.C., Spring 1957.*

This biannual publication of the Prosthetic Research Board includes an introduction and three well illustrated major sections followed by a digest of activities and technical notes from the Artificial Limb Program.

Dr. Charles O. Bechtol, in his introduction entitled "Getting Down to Cases," gives us an illuminating brief review of the evolution of the program and an understanding of the background of the first two reports.

The first, "Some Experience with Prosthetic Problems of Upper-Extremity Amputees," comes from the group at the University of California at Los Angeles. Since 1950, they have worked intensively with some 300 arm amputees. This report selects 23 representative cases which are reported in some detail and from which some interesting conclusions are drawn.

The second paper, "Some Experience with Prosthetic Problems of Above-Knee Amputees," like the first is a group effort, but from the University of California under the supervision of Howard D. Eberhart, Professor of Civil Engineering; and Verne T. Inman, Professor of Orthopedic Surgery. Again, we are given case reports, a survey of the most common problems of fitting, and the best available solutions.

Dr. Sterling Bunnell (whose death occurred while this issue was on the press) contributes a distinguished article entitled "The Management of the Nonfunctional Hand—Reconstruction vs. Prostheses." He reviews the fascinating development of surgical reconstruction of the damaged hand and the equally amazing development of prosthetic devices. His carefully balanced weighing of all factors concludes with "reconstruction whenever the anticipated result is likely to serve satisfactorily the needs of the individual concerned."

While these papers are quite naturally concerned primarily with problems of surgery and prosthetics, they provide valuable and up-to-date background information for the physical therapist who is in any way concerned with the amputee.

The reviews here published have been prepared by competent authorities and do not represent the opinions of the American Physical Therapy Association.

Our Book Reviewers for July

Carolyn Bowen, Physical Therapy Consultant, Washington State Department of Health, Seattle.

Margaret S. Sandin, Rehabilitation Nursing Supervisor, Lemuel Shattuck Hospital, Jamaica Plain, Massachusetts.

Catherine Warren, Chief Physical Therapist, Peter Bent Brigham Hospital, Boston.

Frederick E. Vultee, M. D., Assistant Professor of Physical Medicine and Rehabilitation, Medical College of Virginia, Richmond.

Jack Wickstrom, M. D., Department of Surgery, Division of Orthopaedics, Tulane University School of Medicine, New Orleans.

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Rehabilitation of Handicapped Homemakers

Films, publications, and exhibits on "Work Simplification in the Area of Child Care for Physically Handicapped Women" have been developed by the School of Home Economics, University of Connecticut, in cooperation with the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare. A pamphlet describing films, publications, and exhibits is available. Requests should be addressed to:

Handicapped Homemaker Project
School of Home Economics
University of Connecticut
Storrs, Connecticut

Information for Contributors

The Physical Therapy Review welcomes original articles of interest to physical therapists throughout the world. Prompt reviewing and processing of papers will be assured if attention is given to the following suggestions.

Manuscripts are accepted with the understanding that they have not been published elsewhere. Contributions may be classified as "Feature Articles," "Suggestions from the Field," or "Case Reports." Feature articles are longer and deal rather extensively with the subject presented; suggestions from the field are brief and describe the instrument or device presented; case reports are short and concerned with discussion of a treatment for a specific type of disease or disability. All material should be presented in a clear, logical, and impersonal discourse.

Submit the original *manuscript* and one carbon copy (keep one carbon copy for your files). All written material should be typed, double-spaced with minimum margins of 1 inch on 8½ x 11 inch opaque white paper. Legends for illustrations, tables, references, and acknowledgments should be placed each on a separate sheet. When citing another author's work, a superscript numeral must appear in the body of the manuscript. The *references* must be accurate and numbered in the order in which they appear in the text. Include the name of each author, title of the article, name of periodical, volume number, inclusive pages, and date.

Illustrations should be protected by cardboard and the name of author and figure number written with soft pencil on the back. If *photographs* are used, sharp black and white prints on glossy paper are required, avoid distracting backgrounds. Graphs, charts, and line figures drawn with india ink on heavy white paper are necessary for good reproductions. Letters and figures should be large enough so that they will be readable when reduced for publication. Tables are reproduced more legibly when the carbon is reversed and typing occurs on both sides of the paper.

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American Hospital Association–American Physical Therapy Association Institute for Physical Therapists

The next Institute for Physical Therapists co-sponsored by the American Hospital Association and the American Physical Therapy Association will be held at the Bellerive Hotel, Kansas City, Missouri.

The Institute Planning Committee composed of members of the Western Missouri and Kansas Chapters of the American Physical Therapy Association is already hard at work and has met with representatives of the American Hospital Association to plan an informative and interesting Institute. Program details will be sent later, but plan now to attend and reserve the dates of Nov. 10–14, 1958.

What's New . . . . . .

70. Finger-Tip Control

Finger-Tip Control kits make possible easy conversion of cars equipped with automatic transmission and power brakes to hand control. A short movement of only one hand lever spans the range from full power to full brake. Very little effort is required to hold the lever at cruising power yet it will return safely to neutral from either power or brake position if released. The lever is conveniently located near the rim of the wheel so that lever and steering wheel may be controlled with one hand. The car equipped with Finger-Tip Control can be driven safely by any normal person since the device does not obstruct foot operation of pedals. Safety-Magic Sales Company.

71. Dangers in the Kitchen

Dangers in the Kitchen is a 16-page, two-color publication which presents the family kitchen as the "nerve center of the home." Precautions to be observed so as to insure safety include how to safely handle knives, can openers, graters, grinders and choppers, slicers, slippery floors, open cabinet doors and drawers, electrical wiring and outlets, grease fires, cooking utensils, gas and electric ranges, cabinets and shelves, polishes, cleaners and insecticides. A special section discusses "Poisons in the Kitchen," while another offers basic safety rules for children. The booklet concludes with a safety "checklist," and a "tear-sheet" strip for writing in emergency phone numbers to be posted on a kitchen bulletin board or inside a cabinet. American Visuals Corporation.

For more information on items write to The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.

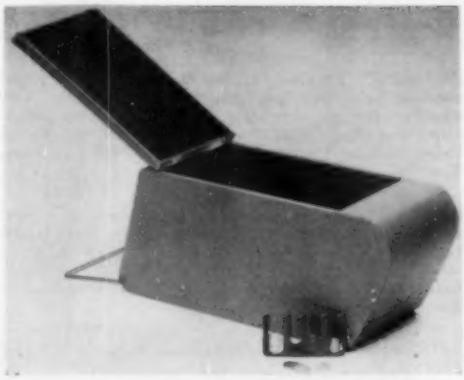
New items which may be of interest to physical therapists will be mentioned in these pages each month. The accompanying explanations are made by the manufacturers and have not been investigated by the *Physical Therapy Review*.

72. Ball Bearing Feeder

Ball Bearing Feeder permits the patient who has a partial paralysis to feed himself with a minimum of effort and to perform a variety of beneficial activities. The clamping bracket fits all types of metal wheel chairs. The feeder is the Warm Springs' type and works on the principle of balance and elimination of gravity with friction free ball bearings. It is constructed of steel except for the trough which is of aluminum. Rehabilitation Products, American Hospital Supply Corporation.

73. Car-y-all

The custom-built Car-y-all is a convenient storage compartment, holding multiple necessities, while acting as an arm rest for the driver; also substitutes as a kiddie seat; can be used on front or rear seat. Covered handsomely in Ostrich Pyroxylin fabric with antique finish, scuff-proof and washable, available in colors; luggage type construction. Nu-Items Corporation.



Positions Available

STAFF OPENING: at Iowa Methodist Hospital, Des Moines, Iowa. Hospital has 400 beds, including Raymond Blank Memorial Hospital for Children. Construction under way of 120-bed rehabilitation unit. Excellent chance for advancement. In- and outpatient work. Competent professional staff and assistants. Excellent working relationships. Apply Personnel Director.

WANTED: PHYSICAL THERAPIST (female) for full or part-time work in orthopedic surgeon's office. Write to Daniel B. Eck, M.D., 144 South Harrison Street, East Orange, N. J.

Registered Physical Therapist, NEW GRADUATE, experience not necessary. Position available September 1, 1958. Salary open. Write to: Dr. Dwight Frost, Physical Medicine and Rehabilitation, University of Nebraska College of Medicine, 42nd and Dewey Ave., Omaha, Nebr.

PHYSICAL THERAPIST (male)—325-bed general university hospital affiliated with medical school and nursing school in suburban Atlanta, Georgia. Department of Physical Medicine under direction of Dr. Robert Bennett. Air conditioned, predominantly neuromuscular cases with pool for underwater therapy. Excellent benefits including 2-3 weeks vacation, sick leave, Social Security, life insurance and other benefits. Starting salary dependent upon experience of applicant. Forty-hr. week. Must be registered with the APTA and Registry. For further information or application contact Personnel Office, Room 203, Administration Building, Emory University, Emory University, Georgia.

GRADUATES OF APPROVED SCHOOLS FOR PHYSICAL THERAPISTS—California has positions open in State Hospitals, the Veterans' Home and special schools for handicapped children. Require registration with California Medical Board. Liberal employee benefits and retirement plan. No experience required to start at $395; raise to $415 after six months; promotional opportunities to $530. Write State Personnel Board, Box 71, 801 Capitol Avenue, Sacramento, California.

WORK IN SOUTHERN CALIFORNIA: Physical therapists needed to staff new Rehabilitation Service at Rancho Los Amigos Hospital. All aspects of rehabilitation of all age levels including postacute and convalescent care of respirator patients, general medical, and orthopedic disabilities and all aspects of bracing and prosthetics. In-service training program under direction of physical therapy instructor. Five-day, 40-hour week, holidays, sick leave, vacation privileges, retirement benefits with Civil Service rights. New building and most modern equipment available. Quarters available, laundry furnished. Good beginning salary, annual increases. Write: Personnel Director, Rancho Los Amigos Hospital, Downey, California.

(continued on next page)

Classified WANT-ADS

RATES

The rate per insertion is $1.00 per line. Typewrite your advertisement carefully and count 50 characters and spaces per line.

ALL WANT-ADS MUST BE PAID FOR IN ADVANCE. Make checks or money orders payable to the American Physical Therapy Association.

Closing date for copy and cancellations is two months preceding publication date.

Institutions or physical therapists who do not wish their identity known may arrange for Blind Ad Code No. All such want-ads must include the following which will be counted as 2 lines:

Address replies to ..... care of **The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.**

IMPORTANT

It is understood and agreed that the publisher shall have the right to reject or change the wording of any advertisement which in the opinion of the Editorial Board shall not be in agreement with the ethical standing of this publication.

Positions Available

QUALIFIED PHYSICAL THERAPIST for outpatient cerebral palsy treatment center. Liberal salary. Two months' vacation, sick leave. Liberal personnel policy. Contact Robert Schlitt, Director, Peninsula Cerebral Palsy Training Center, 901-24th Street, Newport News, Virginia.

Registered Physical Therapist for established department in 370-bed general hospital, enlarging. Good salary, vacation, sick leave, retirement plan. Good location, 25 miles from BLUE RIDGE MOUNTAINS. Write George Robinson, R.P.T., Physical Therapy Department, General Hospital, Spartanburg, S. C.

INTERESTED IN REHABILITATION? STAFF PHYSICAL THERAPIST: varied case load, modern equipment, excellent medical supervision; 5-day week, liberal vacations, sick leave, salaries. Pleasant staff residence optional. Near ski areas and summer resorts; 70 miles from Boston. Crotched Mountain Children's Center, Greenfield, N. H.

IMMEDIATE OPENING for physical therapist in an outpatient treatment program at the WORLD'S MOST FAMOUS BEACH. All year round vacation land. Work with all physical disabilities and all age groups. Five-day, forty-hour week. Paid vacation, holidays and sick leave. Social Security. Apply Christine Haukland, Chief Therapist, Junior Service League Orthopedic Center, 1219 Dunn Avenue, Daytona Beach, Florida.

WANTED: Registered female physical therapist; new modern 300-bed general hospital; 40-hour week, 6 paid holidays, 2 weeks' vacation annually. Immediate opening. Salary commensurate with experience. Address: Assistant Administrator, Bishop Clarkson Memorial Hospital, Omaha, Nebraska.

Rehabilitation and general medical hospital desires services of additional physical therapists, male or female. Near New Haven, close to Hartford and Waterbury. Fully equipped, air-conditioned physical therapy department. Policies and consultation by Dr. Thomas Hines, Physiatrist-in-Chief, Yale University, Department of Physical Medicine. Physical Therapist-in-Charge, Miss Charlotte Kinney, B.S., R.P.T. Salary open. Personal interview requested. Address Chief Physical Therapist, Box 440, Wallingford, Conn.

PHYSICAL THERAPIST for growing outpatient clinic in industrial area. Emphasis on rehabilitation of children at present. To begin employment in September 1958; 40-hr. wk., 5 da. vac., S.S. Apply Christine K. Kline, P.T. Executive Director, 209 W. Woodland, Youngstown, Ohio.

IMMEDIATE PLACEMENT for additional qualified staff physical therapists (male or female) for physical medicine and rehabilitation institute serving two hospitals, in largest centrally located industrial center in Illinois. Full time medical supervision, 40-hour, 5-day work week, excellent salary with regular increments. Write: Administrator, Institute of Physical Medicine and Rehabilitation, 619 North Glen Oak Avenue, Peoria, Illinois.

WANTED: Registered Physical Therapist. Unusual opportunity with hospital-clinic group in 130-bed hospital expanding to 200 beds this year, including addition of new PT Dept; 20-man specialty group located in hospital. Dept. under direction of orthopedic surgeon. New graduate acceptable. Salary open. Exceptionally pleasant work atmosphere. Apply Administrator, Holzer Hospital & Clinic, Gallipolis, Ohio.

PHYSICAL THERAPISTS: Staff positions. Opportunity for varied experience; 650-bed general hospital, near center of cultural and educational activities. Vacation, sick leave and social security benefits. Apply Personnel Director, Harper Hospital, Detroit 1, Michigan.

REGISTERED STAFF physical therapist for 600-bed private teaching hospital with 30-bed Rehabilitation Center. Both inpatients and outpatients. Beginning salary $325 per month with regular increments and vacation pay. Write Harold N. Neu, M.D., Director, Rehabilitation Center, Creighton Memorial St. Joseph's Hospital, Omaha, Nebraska.

QUALIFIED PHYSICAL THERAPIST wanted in a 259-bed General Volunteer Hospital located in suburban area of greater Detroit. Completely air conditioned. Attractive working conditions. Liberal fringe benefits. Apply Director of Personnel, William Beaumont Hospital, 3601 W. 13 Mile Road, Royal Oak, Michigan.

PHYSICAL THERAPIST for 500-bed, private, general hospital located near the "loop." Two years' experience preferred. Variety of cases. Insurance, paid vacation, sick leave, and other benefits. Write Personnel, St. Luke's Hospital, 1439 South Michigan Avenue, Chicago, Illinois.

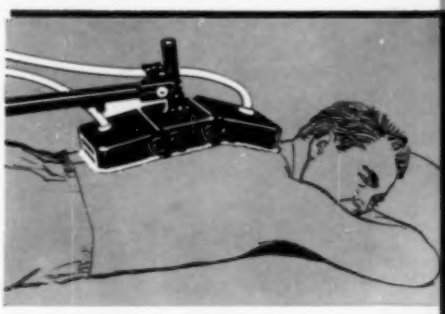
CHIEF PHYSICAL THERAPIST: Starting salary at the rate of $6,420 per annum. Annual increments. Female only. Minimum of four years general experience in established physical medicine department. Interest in neuromuscular and joint problems. Also concept of total rehabilitation. Ability to work with full-time board certified physiatrist and supervise one staff therapist essential; 200-bed general hospital. Growing outpatient service in eastern Kentucky. Also available staff therapist positions in smaller community hospitals. Salary at the rate of $5,340 or $4,440 per annum depending on experience. Each hospital part of integrated three-state network. Progressive minded medical staff, modern equipment, excellent personnel policy. For application forms and further information write:

MINERS MEMORIAL HOSPITAL ASSOCIATION
Box #61, 110 Logan Street
Williamson, W. Va.

WANTED IMMEDIATELY: Registered physical therapist for doctor's office located in Red Bank, New Jersey. Four days a week. Salary open. Address replies to Box 27 care of the Physical Therapy Review, 1790 Broadway, New York 19, N. Y.

FULL POWER ALLOWS DEEP HEATING

BURDICK MF-49 UNIVERSAL DIATHERMY



Full-power tube output of the MF-49 allows deep heating and large-area treatment when needed. The high output in relation to input is obtained by a separate tube circuit that controls frequency. This circuit remains unaffected by the patient circuit.

The MF-49 is adaptable to every technic. It can be used with contour applicator, air-spaced electrodes, induction cable, cuffs and pads, internal electrodes, and for minor electrosurgery.

It has been listed for safety by the Underwriters' Laboratories, and for non-interference by the F.C.C.

The Burdick Syllabus, a bulletin on physical medicine, will be sent you on request.

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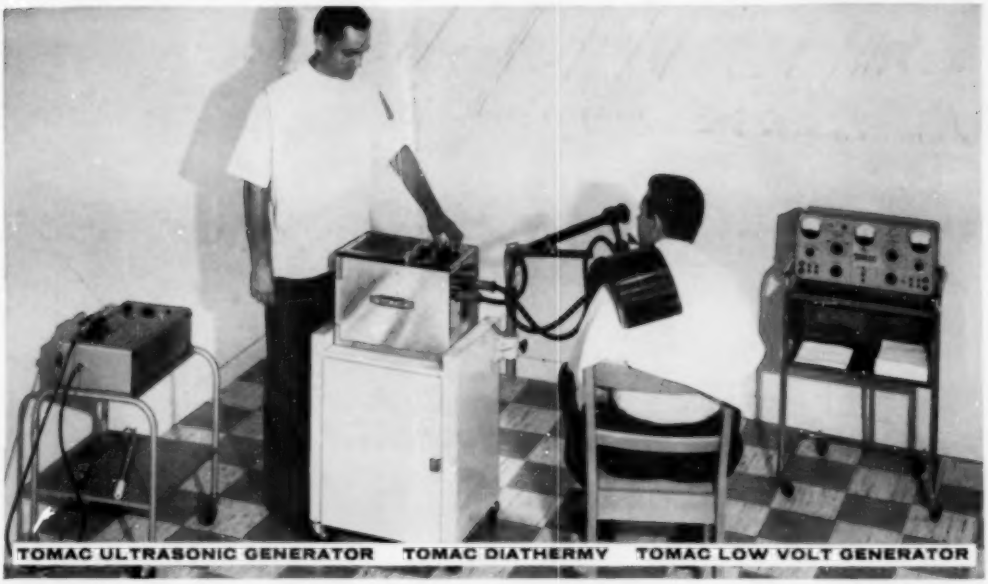

TOMAC ULTRASONIC GENERATOR TOMAC DIATHERMY TOMAC LOW VOLT GENERATOR

R/P...your best source for ALL electro-medical equipment

R/P provides the physician and therapist not only with the most advanced and complete electro-medical instruments, but also the advantages of single-source purchasing. In addition to the exclusive Tomac Electrotherapy equipment illustrated, R/P, as a national distributor of major lines, offers all types of diagnostic and therapeutic equipment for limitless treatment potential.

• NEW TOMAC STANDARD DIATHERMY UNIT

All applications of medical diathermy are possible with this new compact unit—convenient, adjustable induction electrode, inductance cable, air-spaced condenser, cuff, pad, sinus mask and other electrode designs. Easy-to-read controls are permanently marked. All power tubes are specially designed for exceptional durability. Unit meets all FCC requirements. Tan deluxe cabinet. 120 volts, AC. Guaranteed one year.

No. 1565A—Each $688.00*

• TOMAC PORTABLE ULTRASONIC GENERATOR

This 28 lb. unit is so conveniently portable and compact it may be carried from patient to patient. It may be hung on the wall or used with No. 1701 Tomac Cart for greater mobility. The Tomac Ultrasonic Generator is available with straight or angulated hermetically sealed treatment heads. Underwater treatment accessories (No. 1702) include a 90° deflector with 2 suction cups and transducer holding handle.

No. 1707—Including wall bracket:
with angulated sound head...$385.00*
with straight sound head.....375.00*

No. 1702—Underwater treatment accessories.....21.00*

• TOMAC MOBILE LOW VOLT GENERATOR

This low volt therapeutic generator provides current for: comfortable stimulation of normal nerves and muscles, effective muscle stimulation with denervation present, ion transfer therapy, muscle and nerve testing and medical galvanism. The unit has two generating sections, separate circuits for AC stimulation and DC therapy that may be used simultaneously. Unit has eleven calibrated frequencies. There are individual meters for AC and DC circuits, separate test terminals and switch with easy-to-operate control panel.

No. 1721—Each.....$465.00*
No. 1722—Stand, each.....35.00*

***Less 10%**
institutional discount

For complete information on this electrotherapy equipment, consult your Rehabilitation Products representative or write our regional office nearest you.

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